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THE

MAGAZINE OF NATURAL HISTORY,

AND

JOURNAL

OF

ZOOLOGY, BOTANY, MINERALOGY, GEOLOGY,
AND METEOROLOGY.

NATURALISTS AND LOVERS OF NATURE
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BY J. C. LOUDON, F.L., G., & Z.S.

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PREFACE.

In glancing over the Table of Contents of this Third Volume of the Magazine of Natural History, the reader cannot fail to observe the great increase in the number of its contributors. As nine tenths of these are personally strangers to the Conductor, and write for the promotion of science or for their own instruction, he cannot but consider this circumstance a proof of the increasing interest of the work, and of the gradual advancement of a taste for Natural History in this country. It would argue a want of generous feeling on his part, were he not to acknowledge how much he is gratified at having projected a work which seems to have supplied the wants of the times, in the department of which it treats.

Periodical works may be divided into two classes: those which are supported by the voluntary contributions of their readers; and those which are forced into circulation by the hired communications of eminent writers. In our opinion, the first class alone answers the legitimate object of a Journal of Science. A forced periodical of any kind is like an exotic plant, which requires to be continually nursed in a hot-house: a self-supported journal, or one naturally arising from the wants of the times, is like an indigenous plant, or a plant that has been naturalised, and which will thrive with ordinary care and culture in the open air. A self-supported Magazine of Natural History may be considered as representing the wants and wishes of the lovers of Natural History of the time and country in which it appears: a forced journal of any kind can only be considered as representing the personal wants and wishes of the parties concerned in its production. The latter description of periodical may for a time be more conducive to the fame and profit of its authors and owners: the former will naturally at first be defective in these objects; but in both of them it may be reasonably expected to increase as it proceeds.

Such is the theory which we have deduced from our experience in the conducting of periodicals; and it is partly in conformity with that theory, and partly to comply with the request of a number of our readers, that we have in this Third Volume brought to a conclusion most of our Introductions to the different branches of Natural History, originally intended to be continued through several volumes. In every other respect we have adhered to our prospectus; and we hope to go on in the same course for many years to come, gathering strength as we proceed; and so rooting this periodical into the literature of the country, as that there must always in future be in these islands a Magazine of Natural History.

With the present Volume is given a *Glossarial Index* to the technical terms made use of from the commencement of the work up to the present time, with references to the pages where will be found their explanations at length, and their application to the different departments of natural science. As the first step towards the knowledge of the nature of things, and to the communication of that knowledge to others, is to know their names; so we would earnestly recommend to our young readers, or generally to all those who feel that they are not yet beyond the age of acquiring new ideas, to study this Glossary word by word. We would recommend them to turn to every page referred to, so as not only completely to understand the word and its application, but to impress on the understanding and the memory the subject in the discussion of which the application is made. This will be to master a part of every branch of Natural History, and to make the Magazine, as far as it has hitherto proceeded, the reader's own. The ideas communicated to the world in this Magazine proceed from the minds of some hundreds of individuals, all directed to the same subject; they are, therefore, much more worthy of being fixed in the memory than those of any one individual; for example, in a single treatise. This is a proposition which will bear discussion at length; but we must leave it for the present, and conclude by hinting that those who peruse a scientific magazine, as they would glance over a merely literary periodical, are spending their time to very little purpose.

J. C. L.

Bayswater, Oct. 18. 1830.

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NATURAL HISTORY.

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Art. I. *Some Account of the Life, Genius, and Personal Habits of the late Thomas Bewick, the celebrated Artist and Engraver on Wood.* By his Friend John F. M. Dovaston, Esq. A.M., of Westfelton, near Shrewsbury.

(*Continued from* Vol. II. p. 435.)

> " A semely man our hoste was with alle,
> For to han ben a marshal in an halle.
> A largé man he was with eyen stepe,
> A fairer burgeis is ther non in Chepe:
> Bold of his speche, and wise, and wel ytaught,
> And of manhed him lacked righté nought.
> Eke therto was he righte a mery man,
> And after souper playen he began,
> And spake of mirthe amonges other thinges," &c.
> Chaucer, *his Hoste.*

Sir,

I pass on to another personal interview, which took place on my return from a very long and laborious tour through the Hebrides, Highlands, and the greater part of Scotland, in company with the same friend and fellow-traveller, John E. Bowman, Esq., F.L.S., in the summer of 1825. It was midnight when we arrived in Newcastle on Tyne, from Berwick on Tweed; and we lay at our old quarters, the Queen's Head Hotel, in Pilgrim Street. By eight in the morning we were at his house, and it was his birthday (12th of August), on which he attained 72. The family had broke fast; and had sat up for us the two last nights, in consequence of a letter I had written him from Perth of our intention of returning to England through Northumberland, provided he were at home; to which I at Edinburgh got a most kind answer, offering us a Highland welcome to his open house, hand, and heart. They were all in high spirits at again seeing us; and during our breakfast the conversation was hurried and hearty. As my friend, the banker, could remain but one day, he left me behind, where I fondly lingered till 18th of August.

> "Another day, another day,
> And yet another pass'd away."

When the tide and effusion of heart at meeting had somewhat subsided, we settled down into calmer delight. They showed me almost exhaustless drawers of blocks he had cut for his past and his future writings; and as he sat at work, I enjoyed his more deliberate and sound conversation, accompanied by strains of his most extraordinary powers of whistling. His ear (as a musical feeling is called) was so delicately acute, and his inflexorial powers so nice and rapid, that he could run, in any direction or modulation, the diatonic or chromatic scale, and even split the quarter notes of the enharmonic; neither of which, however, did he understand scientifically, though so consummately elegant his execution: and his musical memory was so tenacious, that he could whistle through the melodies of whole overtures; and these, he said, he could obtain having once heard from the orchestra of a playhouse, or a holiday band, in both of which he took extreme delight. In proof of this I tried him to some extent, by flinging on his piano-forte several wild airs I had taken down from pipers in the Hebrides and Highlands, of difficult and intricate evolution, which he completely repeated the first time. Lest he might have heard these before, I farther sprinkled at him (without information of their originality), several private imitations, I had myself composed, of various national melodies, which he not only instantly and spiritedly whistled, but remembered long after; as I found when sauntering with him amid the mountains of Derbyshire. I have always thought music one of the greatest and surest tests of talent; and this, with numberless instances, corroborates my confirmation. I, moreover, confidently believe, that the universally quoted and remarkably bold passage of that wholly delicious scene in *The Merchant of Venice*, has intensely much more illustration of moral and physical truth, than millions are capable of imagining, or willing to admit. The *aroma* of music has nothing to do with the ear; it exists in every atom of the nervous temperament, connected intimately with exquisitely fine understanding: all can *hear* it, though having no more music in themselves than has a post, most likely nothing near so much, though all vow they love it prodigiously. But I am not scribbling a tractate on music: indulge me, gentle reader; I know thou wilt, if musical: if not, ungentle reader, think thyself wise, look foolish, and cry baa!

His table I found, as usual, familiarly frequented by gentlemen of learning, wit, and worth; abundance of whose conversation I could readily record, were it not extraneous to my limited purpose. Mr. Billington, however, I cannot omit, as he forms one of the hourly instances that verify the liberality of him I am slightly delineating. This gentleman, the author of a very useful and well-written book on planting, was persecuted by some state vermin, because he would not connive at their depredations on the country, and turned out of his office, with a heavy family. He was instantly encouraged by the generous Bewick to persist in his integrity; for "truth," he said, "would ultimately come down like a sledge hammer." It did so, indeed; their roguery was detected, and the poor gentleman, after fighting eight hard years with pen and penury, not only triumphed over his opponents, but was selected for promotion to a higher and more lucrative situation. This, he has often since told me, he should never have had patience or courage to have achieved, but for his hourly thoughts of honest Bewick's "sledge hammer."

I found that the good people of Newcastle had erected a magnificent edifice of great elegance, for the purposes of philosophy, collections, and a library, in which they intended the first piece of statuary to be a figure of their honoured townsman, then under sculpture by Baily, at a subscription of only 1*l.* each, so as to admit the greater number. To this list I was permitted to add my name, with those of several of my Salopian friends, who have since repaid me with cordial satisfaction. Frequently, as I walked with him along the streets, it was gratifying to witness how much and how generally his character and talents were respected; particularly when many who bowed to him differed totally from him in opinions, on a subject that ought to conciliate, but far too often sets little minds at inveterate hostility with great ones. An amiable touch of character showed itself in the many ragged children who followed him for halfpence, and would not leave him till he had imparted the customary largess. He turned to them several times, while he was talking to me, saying, "Get awa', bairns, get awa'; I hae none for ye the day." As they still kept dogging him, and pulling at his coat, he turned into a shop, and throwing down a tester, said, in his broad dialect (which he neither affected to conceal, nor pretended to affect), "Gie me sax penn'orth o' bawbees;" and throwing the copper among the children, said kindly, and with a merry flourish of his cudgel, "There, chields, fit yoursels wi' ballats, and gae hame singing to your mammies." He was particularly fond of playing with little children, who, notwithstanding his bulky appearance, and extremely rough face, suffered themselves to come unto him; and among the numerous and ill-sorted contents of his capacious pockets, he generally (like the all-hearted Dandy Dinmont) had an apple, a whistle, or a bit of gingerbread, together with pencil ends, torn proofs, scraps of sketches, highly tinted with the yellow ooze of huge pigtail quids, in divers stages of mastication.

Yet gentle, generous, and playful as he was, his personal strength and courage was prodigious: and notwithstanding his ardent feelings of humanity towards all animals, particularly dogs, horses, and birds, in defending many whereof he had drawn himself into scrapes; yet, when his own safety was at stake, he could repel an attack with a vigorous heart and arm: for he told me, as how going into a tanyard, a great surly mastiff sprang upon him, and how he caught said mastiff by the hind legs, and "fetched him, wi' his cudgel, such a hell o' a thwacker owre the lumbar vertebræ, that sent him howling into a hovel."

My pleasantest time was at nights, when, without strangers, I enjoyed the full flow of talk while smoking with my noble-hearted friend, and his son, Robert Elliot Bewick, a modest ingenious youth, remarkable for his surprising skill in playing on the Northumbrian pipes; and whose elegant taste and talent for drawing I cannot better praise than by calling him "a chip of the old *block*." The two younger daughters were interesting by their unobtrusive attention and courtesy, showing manners that give ease and grace to society, and kindness that cannot be mistaken. Of his eldest daughter, Jane, whom he called his "right hand," I feel it difficult to speak in print, lest even the gentlest truth offend her unaffected modesty; so resort to THE POET, touching his Desdemona:—

——— "A maiden never bold;
Of spirit so still and quiet, that her motion
Blush'd at herself: . . . . . . a maid
That paragons description, and wild fame;
One that excels the quips of blazoning pens,
And in the essential vesture of creation
Does bear all excellency."

She was mistress of her father's house, which she conducted with silent and quiet management, so that every thing seemed done by enchantment, without bustle or disturbance, and all without hurry or care. She corrected the press for his works, and saw to the getting them up; wrote his letters of business, and kept his house and workshops in order. Her greatest delight was in his fame, and she looked on him almost with adoration, as he did on her. The formation of her person and deportment was particularly graceful and fascinating; her features lovely, and brilliantly animated with intelligence; and her gentle spirit gave a glow to all her excellencies. Her conversation was frank and unreserved, yet with modest demeanour, speaking her mind without regard to the opinions of others, yet giving offence to none. Her manners and countenance were so bewitching, that she might say what she pleased, " in sweet sounds, that give delight, and hurt not."

Mere dates and dry facts are laborious to record, and almost loathsome to read; yet as they occur, I enter upon them as a duty, with something like the determination of a traveller, who, after loitering through the labyrinths of a woody and cooly-watered country, interspersed with peering rocks, ivied bridges, and romantic dingles, comes at once upon a common just enclosed, with an interminable tape of dusty road stretching straight before him, without a tree for shade, or object for contemplation, save a milestone on one hand, and a finger-post on the other; *that* reminding his suddenly slackened spirit of the distance *from*, and *this* the direction *to*, his destined period of repose. Yet even roads like these are not without their lichens and mosses, their insects, and their fossil fragments, the remnants of an earlier age. These remarks lead me to a work but little known, yet having much connection with my main object. I found, on strolling into the shop of Mr. Emerson Charnley, that in the year 1820 that gentleman had published a volume of Fables, as a vehicle for impressions of the earlier blocks, both of head-pieces and vignettes, engraved by Bewick, in his very young and inexperienced labours. These cuts were all executed previous to the year 1785, many of them for Mr. Thomas Saint, an extensive printer in Newcastle, to adorn his very various publications; and were afterwards purchased by Hall and Elliot, printers; and after remaining with them several years, were bought by Messrs. Wilson of York, who long kept them unemployed, with other blocks from the same quarter. This collection, amounting to upwards of twelve hundred, was obtained by Mr. Charnley in 1818, who, quite aware that Mr. Bewick wished it fully to be understood, that *he* had not any desire to " feed the whimseys of bibliomanists," has very properly published a volume of them, preserving from destruction and oblivion, as a few curious morsels to collectors, these very early specimens of the revival of that exquisitely valuable and admirable art. It is incumbent to mention that this book contains several tail-pieces worked by Mr. Isaac Nicholson, a pupil of Bewick, which may be readily discriminated by their apparent excellence. The Old Exchange in the title was cut by Bewick in 1719. This volume, valuable in many views, contains an impression of the celebrated "Old Hound," which obtained his first public prize in 1775, when only twenty-two. It also contains FIVE portraits, on wood (copies), at different and distant periods, of the broad open features of my benevolent friend: that facing the title, from a painting of James Ramsay, is the nearest likeness during the years I knew him. It also contains a catalogue of his (congregated) works up to the year 1820. The editor very honestly and openly disavows his intention for one moment of putting these pieces in competition with the later productions; but of showing the early powers, the gradual progress, and vigorous march of this great master. And I contemplate them with the same kind of curious pleasure, as I should the boyish rhymes of some great poet's first sonnet to Delia's shoe-tie, elaborated aneath a green weeping birch, when his years scarce equalled the number of verses whereunto he was limited by the gagging-bill of Petrarch. It may not be amiss to instance a few; as The Dog and Shadow, Bear and Bees, Wanton Calf, Trout and Gudgeon (angler's attitude), Horses' Petition, &c. In these and others the infant Bewick is very visible, particularly in the *motion.* Some insects, too, as tail-pieces, are so accurate, as at once to be specific to an entomologist; as the *P*apílio Mégar*a*, Libéllula variegàta, Pónti*a* *b*rássicæ. And the vignettes partake of his determinate propensity to morality, tenderness, and humour; each (as ever) telling articulately its own tale: as (to cite but one or two) that of Parson Fatpate, his fat wife, with fat pug-dog, waddling to a fat dinner, after a fat sermon, at Fatsty church, on a fat-melting Sunday; the reverend personage's motion and legs are *peculiarly* clerical. The beautiful story of Abdallah and the Magic *Candelabrum* is told at a glance. Another very admirable hit is at a dignified priest, creeping to duty under the shade of a parasol, evidently (by his index-finger and closed hand) giving his blessing, but no *bawbee,* to a ragged wooden-legged soldier, holding out his hat, while behind him his cocked-legged cur is *stroaning* against the parson's gown. In the distance is seen the church, and a yeoman sweating under a heavy load. This is just a *swatch* of Bewick's way. The middle-aged gentleman on the garden-screen is on a visit to the husband of his early love; while *they* are walking from him down the avenue, wishing him in — heaven, or at home. A less fertile mind than HIS of Abbotsford might imagine a romance of terror by a glimpse at that dead knight in moonlit armour, cold, and recumbent on a sepulchral monument under the Gothic window of a ruined monastic cemetery — I just heard the sullen toll of the spectral curfew. Methinks no mean amusement might be elicited by extemporaneous little novelets, taking the colour of the occasion, invented for the nonce, from Bewick's tail-pieces, to minds utterly awearied and disgusted with the cards and cant of a fashionable *drawling*room. But I must on. We enjoyed our evenings as may well be conceived, with such a host at our head; often till broad morning began to spread her bright drapery along the east; and even the admonishing sunbeams to *keek* through the shutters, laughing out the candles. Be up as early as I could, I always, were the morning fine, found him walking briskly in his garden, for exercise. His *ornithic* ear was quick and discriminative; he one morning told me he had then first caught the robin's autumnal melody, and said we should have a premature fall of the leaf; we had so, after the excessively hot summer of 1825. I had heard this robin as I lay in bed, feeble and infrequent; and as we walked in the garden, a passerine warbler, Sýlvia horténsis (whom, from his profusion of hurried and gurgled notes in May, I call the *Ruckler*), just gave a touch of his late song, which the fine ear of Bewick instantly caught, though in loud and laughing conversation. At meals he ate very heartily, and, after a plentiful supply, often said he could have eaten more. In early, and indeed late in, life he had been a hardish drinker; but was at this time advised by his medical friends to be more abstemious, which he abode by as resolutely as he could, though not without now and then what he called a *marlock*. It has been said that Linnæus did more in a given time than ever did any one man. If the surprising number of blocks of every description, for his own and others' works, cut by Bewick, be considered, though perhaps he may not rival our beloved naturalist, he may be counted among the indefatigably industrious. And amid all this he found ample time for reading and conviviality. I have seen him picking, chipping, and finishing a block, talking, whistling, and sometimes singing, while his friends have been drinking wine at his profusely hospitable table. At nights, after a hard day's work, he generally relieved his powerful mind in the bosom of his very amiable family; either by hearing Scotch songs (of which he was passionately fond) sung to the piano-forte; or his son Robert *dirl* hornpipes, jigs, strathspeys, and reels, which failed not to put life and mettle in the heels of the females and younger friends, to his glorious delight. Occasionally his fondling Jane would read Shakspeare to him, or the delightsome Romances of Shakspeare's *Congener* (not to speak profanely), Sir Walter Scott. It has been supposed by many, and publicly asserted by a few, that Bewick never wrote his own works, but was wholly and solely employed on the designs; to this I have his positive contradiction, which would be enough; but that in addition to his own MEMOIR, which I have read in his own MS., I have seen him compose, extract, and translate passages for each bird he has engraved while I was in his house. If his works have any great defect, 'tis the defect of omission; every one laments he has given so little of the history of each bird. I have often offered him to rewrite the whole of the birds wherewith from early and lasting habits I was well acquainted, their characters and manners, interspersed with anecdotes and poetry, particularly from good old Chaucer, the bard of birds, and passages of every bearing brought together, flinging over the whole what may be called the poetic bloom of nature, in which none have so sweetly succeeded as honest White of Selborne. But this he always resolutely refused; alleging that his descriptions, whether original, copied, or compared, were unimpeachably accurate; and that was enough. And not only did he write his own language, but I often thought his talent in that department not surpassed even by the other effusions of his genius; witness his unparalleled Preface to his Fables, and his other Introductions. He said, even to the last, he felt no deficiency of his imaginative powers, in throwing-off subjects for his *tale*-pieces (as I named them), which were always his favourite exercise; the bird or figure he did as a task, but was relieved by working the scenery and back-ground; and after each figure he flew to the tail-piece with avidity, for in the inventive faculty his imagination revelled.

Lingering, and loth to depart, I had now to enter on a long, dreary, and restless travel of three days and nights; through a country the very diametrically reverse of my beloved Scotland, in every thing physical, moral, and intellectual; alone; and immediately leaving the warm precincts of such cheerful and bright society; and deprived of the solace and conversation of my kind and intelligent friend, Bowman, with whom I had just been journeying (I may truly say) some thousands of miles. I felt depressed with a cloud of melancholy to which my merry spirit is unused; yet not unimbued with a sort of soothing glow, that Ossian beautifully calls "the joy of grief." My venerable friend having fondly requested a few verses of mine in his *Memoir*, I feebly broke off (as I do now), leaving, a foil to the gems of far brighter pages, the following "FOURTEENER:"—

Xylographer I name thee, Bewick, taught
  By thy wood-art, that from rock, flood, and tree,
  Home to our hearths, all lively, light, and free,
In suited scene, each living thing has brought
As life elastic, animate with thought.
  Well hast thou Fabled too, would man but see
  Each masqued lure. And oh! what cordial glee
To con thy fancies shrewd, and sharply wrought!
Age-honour'd friend, of open heart and mind,
  Like Nature's fields, all bounteous, broad, and bright
    With freedom, love, sublimity, and mirth;
Thy praise in thy own page fair Truth has shrined
  Gladsome; for each declares, in lines of light,
How heaven's high choral-songs preach to dull ears of earth.

JOHN F. M. DOVASTON.

Westfelton, near Shrewsbury,
Nov. 8. 1829.

(*To be concluded in our next.*) Pr: 97.

ART. II. *A Visit to the Mantellian Museum at Lewes.*

By ROBERT BAKEWELL, Esq.

Sir,

HAVING recently passed part of three days with much satisfaction in examining the various interesting objects in the museum of Gideon Mantell, Esq., of Lewes, F.R.S., I trust I shall render an acceptable service to many of your readers by giving them an outline of its contents. The collection consists principally of fossil organic remains, illustrative of the geology of Sussex. They are in admirable preservation and are very tastefully and judiciously arranged. Many of the specimens in this collection are unrivalled and unique; indeed, we are entirely indebted to the scientific investigations of Mr. Mantell, for the first knowledge of their existence, as well as for the complete proof of the true geological character of the strata below the chalk and green sand which occupy the district called the Wealds, in the counties of Kent and Sussex. When Mr. Mantell first commenced his researches in the vicinity of Lewes, no fossil organic remains had been collected there, nor had the quarry men noticed them in the beds they were daily working, but in the course of a few years, Mr. Mantell, succeeded in obtaining the finest collection of chalk fossils in the kingdom: many of them are described in a splendid work which he published in 1822, entitled *Fossils of the South Downs, or Illustrations of the Geology of Sussex with Forty-two Plates, engraved by Mrs. Mantell.* The most important discoveries of Mr. Mantell were made in the beds of Weald-clay, sand, and sandstone below the chalk and green sand formation. He observed, that though the latter strata, as is well known, contain exclusively the remains of marine animals, such as Nautilites, Ammonites, and Belemnites, with other shells of marine genera, the strata of the former contain almost exclusively the remains of terrestrial plants, and shells analogous to fresh-water shells, or the bones of vertebrated animals, some of which were of enormous magnitude, and were evidently formed for walking on solid ground. The strata in which these remains are found must have been deposited in a fresh-water lake or estuary, or in the bed of a mighty river, on the sides of which lived and flourished plants and animals analogous to those of tropical climates; these strata compose a great fresh-water formation below the chalk.*

The labours of Mr. Mantell did not in the first instance receive the attention that they justly merited. There is a certain prejudice more or less prevalent among the members of scientific societies in large cities, such as London or Paris, which makes them unwilling to believe that persons residing in provincial towns or in the country (*les esprits campagnards*, as they are called) can do any thing important for science; and it is strangely imagined, that a city geologist, who runs over a district in a few days, can make greater discoveries than any one residing in it, who is in the habit of daily and repeated observation. It is true, indeed, that the local geologist may sometimes be liable to draw erroneous inferences which more extended researches might have corrected; but his record of facts, if faithfully given, will always possess the highest value, and contribute to remove geology from the dominion of theory to the empire of truth and to place it on a solid basis.

It was fortunate that the ardent and intelligent mind of Mr. Mantell, enlightened by anatomical and physiological science connected with his professional pursuits, perceived the true value of his discoveries; but, to make them properly appreciated by his own countrymen, the testimony of Baron Cuvier was wanting. This illustrious anatomist pronounced the Iguânodon, discovered by Mr. Mantell, to be a reptile more extraordinary than all those which have been hitherto known (*encore plus*

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* Some geologists would restrict the term fresh-water formations to beds deposited in lakes, but this appears taking a hypothesis for a fact; we know too little of the ancient surface of the earth, to decide whether what are called fresh-water basins were originally lakes, or estuaries, or the beds of immense rivers. From the occasional occurrence of oyster shells in the Sussex-beds, it is highly probable they were deposited in an estuary.

extraordinaire que tous ceux dont nous avons connoissance). It is indeed extraordinary not only from being the largest amphibious or terrestrial animal hitherto known, but from its peculiar structure as *an herbivorous masticating reptile*. These preliminary observations are chiefly made, to prove to your country readers, how much may be done for the promotion of science, even in situations not favourable to its pursuit, at a distance from public museums, and removed from the excitement produced by associating with others engaged in kindred studies.

I now proceed to describe the museum. The room in which the objects are placed has been recently erected by Mr. Mantell for the purpose, and is well lighted from above; the larger specimens are arranged in glass cases, and the smaller ones in drawers below. It has already been stated that the collection of chalk fossils is the finest in the kingdom; it will not be necessary to particularise them, except those which are extremely rare, but it may be observed, that the matrix in which the most delicate animal remains are embedded has been partly removed with a degree of science and care that I have noticed in no other museum, and they are displayed to the greatest advantage. The beautiful series of fishes allied to the Zèus or dorée, from the chalk pits near Lewes, are particularly interesting: one of them is a matchless specimen, the mouth being open and entire, and the tongue exposed; but the most remarkable circumstance is the uncompressed and perfect form of the bodies, which was doubtless chiefly owing to the preservation of the air bladder, for it appears unbroken in many of these specimens. This is an important fact, as it proves that the bodies were completely incased in the chalk, before the putrefactive process had commenced, and adds probability to an opinion I advanced in a former edition of my *Introduction to Geology;* that the formation of many beds in the secondary strata was effected by submarine eruptions of hot water, saturated with earthy matter, which destroyed the animals previously existing, and formed around them a siliceous or calcareous incrustation, that protected their remains from destruction. *

In some of the fossil fishes, the dorsal fins, gills, and teeth are preserved, as well as the air bladder and tongue; the scales are also very distinct. There are many fine specimens of Ventriculites, first described by Mr. Mantell in the 11th volume of the *Linnean Transactions*, and of which an account is given in Vol. II. p. 332. of your Magazine. Vegetable remains in chalk are extremely rare; there are, however, in this collection fine specimens of wood in chalk, and in the centre of flints, and also various remains of marine plants in chalk. An Ammonite of large size, or rather the cast of one, is truly remarkable; all vestige of the shell or animal matter appears to be destroyed, except the siphunculus which is entire, and surrounds the disk like a horny tube, the size of a goosequill. In the *Naútilus*, as is well known, the siphunculus passes through the centre of the chambers, but in Ammonites the siphunculus is on the outer border, it is, therefore, exceedingly difficult to conceive how it could have been preserved so entire in the above specimen. Perhaps it may be interesting to some of your readers to state, *en passant*, that it is now nearly ascertained, that the shells of *Naútili*, and other multilocular-chambered shells, were not the habitation of the animal, as was generally believed; but the shell, whether straight or spiral, was placed within the animal, and performed the function of an air bladder. The animals being enabled by the siphunculus, or tube, which passes through the chambers, to exhaust them or fill them with water, they could thus rise from vast depths or descend at pleasure. The most interesting objects in Mr. Mantell's museum are the fossils from the Sussex-beds beneath the chalk formation, which are altogether of a different character from those in the chalk and green sand. The Sussex-beds, comprising what has been called the Hastings-sand, and sandstone, and the Weald-clay, with the strata of iron-stone, and limestone, abound in vegetable impressions and lignite or wood coal. Many of the vegetables appear allied to the ferns and palms, &c., of tropical climates, and prove the existence of dry land at or before the period when the strata that contain them were deposited. Of these vegetable remains there are numerous fine specimens in this collection, comprising all the fossil species that have hitherto been discovered in Sussex.

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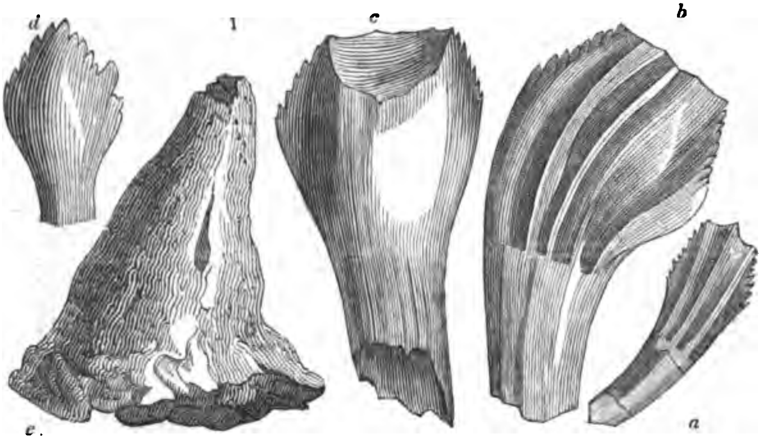
* M. Alex. Brongniart to whom I sent a copy of that work has recently adopted a similar theory to what I had advanced in 1815, that some of the siliceous strata in the Paris basin were deposited by thermal waters holding siliceous earth in solution.

The shells in these beds are, with some exceptions, considered to belong to animals living in fresh water; none of the chambered shells, which are so numerous in the strata above or below the Sussex-beds, have been discovered in them: but the most convincing proof that the Sussex-beds were deposited in fresh water is the abundant remains of terrestrial plants which they contain, and also the remains of large animals, evidently formed for walking on land: these remains render the museum of Mr. Mantell unique. In the strata of Tilgate Forest, near Cuckfield, the remains of four enormous reptiles have been identified, and there are also bones and teeth of other animals, not yet determined.

The large reptiles at present ascertained are the Crocodile, the Plesiosaúrus, the Megalosaúrus, and the Iguánodon. The remains of the crocodile in this museum consist of teeth, vertebræ, ribs, &c., belonging to two or more large species of these animals; one of which Mr. Mantell conjectures was about 25 ft. in length. Some of the teeth present all the essential characters of the teeth of the recent crocodile. The Plesiosaúrus was first discovered in the lias near Lyme in Dorsetshire, and has been well described by Mr. Coneybeare; some bones of this animal have been found in Tilgate Forest, and are in this collection, but nothing approaching to an entire skeleton. The remains of a gigantic animal of the lizard genus were discovered at Stonesfield in Oxfordshire, and described by Dr. Buckland; to this animal he has given the name of the Megalosaúrus. Bones apparently belonging to the same species, particularly the thigh bone, ribs, teeth, and vertebræ, were found at Tilgate, and are placed in this collection. This animal bears the nearest affinity to the monitor, there is a stuffed specimen of the latter in the museum. The Iguánodon is so named from its resemblance, in many respects, to the living iguana. The discovery of the remains of this animal is regarded by Mr. Mantell as the most gratifying result of his labours. The teeth were first discovered by Mrs. Mantell in the coarse conglomerate stone of Tilgate Forest in the year 1822, since which time Mr. Mantell has collected a most interesting series of them, displaying every gradation of form, from the perfect tooth in the young animal, to the last stage, that of a mere bony stump worn away by mastication. These teeth are comparatively rare, and the only locality in which they have hitherto been noticed is in the immediate vicinity of Tilgate Forest. Their external form is so remarkable, and bears so striking a resemblance to the grinders of the herbivorous Mammàlia, that Mr. Mantell was, at first, doubtful respecting the order of animals to which they belonged, but subsequent discoveries proved that they were the teeth of a nondescript herbivorous reptile. Baron Cuvier, to whom they were shown, regards them as belonging to an animal hitherto entirely unknown, but they bear the greatest resemblance to the teeth of the iguana, particularly in having the edges serrated. The iguana is an herbivorous, but not a masticating, reptile. The figures of the teeth which are here given (*fig.* 1.) are of the natural size; but it should be recollected that the teeth of crocodiles and other lacertian animals are very numerous and small, compared with the relative size of the teeth of the Mammalia. To form some notion of the immense magnitude of the animal, it may be useful to mention that I measured the circumference of the condyle, or joint, of a thigh bone in the museum, and found it to be 35 inches! and the thigh bone of a larger animal, at a distance from the condyle, measured 25 in. in circumference. Mr. Mantell justly observes, in his interesting work on the fossils of Tilgate Forest, "Were this thigh clothed with muscles and integuments of suitable proportions, where is the living animal with a limb that could rival this extremity of a lizard of the primitive ages of the world?"

In the teeth which have been little worn the summit is pointed, as at *fig.* 1. *a*, which represents the front view of the perfect tooth of a young animal; but as the animal increases in size and age, the point becomes worn down, as represented at *b*, which is the front view of a full-grown tooth of the natural size. The anterior surface of the tooth *b* is divided longitudinally into slightly concave furrows, by obtuse ridges, the most prominent of which is generally on one side. In the young tooth (*a*) seldom more than one ridge occurs, dividing the surface into two unequal parts. As the animal advances in age, the furrows become obliterated by use and the front worn down, as represented at *c*. With a further advance of age, the tooth is more and more worn down, till it becomes a mere bony plate. This wearing away of the crown of the tooth may be traced in every stage of its progress, among the specimens in Mr. Mantell's museum. Baron Cuvier observes that the process by which these changes have been



effected is clearly that of mastication.* The recent iguanas alone have teeth resembling those of the Iguánodon, particularly in the angular form of the crown, and the serrated edges, as may be seen at *d*, which represents one of these teeth greatly magnified. The metacarpal bones, or those of the feet and toes of the Iguánodon, are of enormous size, one of the tarsal bones measuring 13 in. in circumference; the unguial bone is also in the museum, only one claw has hitherto been discovered. It appears, also, that this remarkable animal had a horn (*e*), which nearly resembles in size and form that of the rhinoceros; it has a bony structure, but it was not united to the skull like the horns of Mammàlia. It is to Mr. Pentland, an eminent naturalist who has studied several years under Cuvier, that we are indebted for information respecting the nature of this extraordinary fossil; when a cast of it was first shown to him, he suggested that it belonged to a saurian animal. A species of living iguana, a native of St. Domingo, has between the eyes an osseous conical horn or process, covered by a single scale; hence this animal is called the Horned Iguana, or *Iguàna* cornùta. This fact, Mr. Mantell observes, establishes another remarkable analogy between the Iguánodon and the animal from which its name is derived. "We have seen," says Mr. Mantell, "that the teeth are at least twenty times larger than those of the iguana of 3 or 4 ft. in length, that the thigh bone is of equally enormous proportions, and were we to calculate the probable magnitude of the original, from the data which the metatarsal bone affords, we might well exclaim, that the realities of geology exceed the fictions of romance."

There is the highest probability, from the resemblance of the teeth and large bones found in Tilgate Forest to those of the iguana, that both the teeth and bones belonged to one species of unknown animal; but, as no portion of the jaw has hitherto been found, we have not at present obtained an absolute certainty respecting this fact. Cuvier, in the last edition of his *Règne Animal* recently published, says that the character of the Geosaúrus † of Sæmmering, the Megalosaúrus of Buckland, and the Iguánodon of Mantell, are not yet so completely ascertained as to enable us to class them with certainty. Should it be eventually proved that the large bones and the teeth, found in Tilgate Forest, belonged to different animals,

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[*] Mr. Mantell conjectures that the food of the Iguánodon consisted chiefly of plants furnished with rough thick stems, as indicated by these remains; hence a peculiar structure of the tooth was required.

[†] *Geo saurus*, earth lizard. *Megalo saurus*, great lizard.

it would rather increase the value of the original discovery, as we should have two new species of enormous reptiles instead of one.

Among the other bones, in this museum, from Tilgate Forest, there are some of one or more species of birds; it ought, however, to be remarked that, as the supposed bones of birds found in the lias have been discovered to belong to a species of flying lizard, it may, therefore, be doubtful whether these bones may not belong to a similar species of reptile. Mr. Mantell, whose authority as a physiologist ought to have great weight, is, however, inclined to refer these bones from Tilgate Forest to birds.

There are the remains of three species of turtles in the Sussex-beds, two of which are supposed to have been fresh-water species: the remains of fishes are also numerous; they consist chiefly of detached bones, teeth, and scales, no entire skeleton has yet been found.

The fresh-water formation of Sussex and part of Kent may properly be named the Sussex-beds; some of them can be traced as far as Dorsetshire westward, but no distinct portion of them has hitherto been discovered in the midland counties. Having recently traversed these beds in various directions, I intended to have offered some observations upon them in the present paper, but it has already exceeded the length I proposed. A very satisfactory description of the strata of Tilgate Forest is given in the second volume of Mr. Mantell's *Illustrations of the Geology of Sussex*, a work which ought to be in every public library, where natural history is cultivated: the forty-two plates in the first volume, it has already been mentioned, were engraved by Mrs. Mantell, without whose able cooperation it would have been impossible for Mr. Mantell, occupied as he is in the arduous labours of an extensive medical practice, to have effected so much for the advancement of science.

Besides the collection of Sussex fossils, this museum contains many interesting organic remains from various parts of the world. Mr. Mantell, with much liberality, allows the museum to be seen by the public on the first and third Tuesdays of every month, from one till three, application having been previously made by letter.

I am, Sir, yours, &c.

Hampstead, Sept. 29. 1829. Ro. Bakewell.

P.S. The horn of the Iguánodon (*e*) is half the natural size, and can only be regarded as a wart, when compared with the size of the animal. The Cy̆pris fâba, which occurs in the Weald-clay, and is frequently referred to by Dr. Fitton and others as a proof of the fresh-water origin of the Sussex-beds, is a minute crustaceous animal, with an oval arched case, or shell, not much larger than a grain of millet. The living species which resemble it the closest are aquatic Monóculi, swimming in fresh water, and depositing their eggs on the leaves of aquatic plants, or in the mud. The shells of Cýpris fàba are found in great abundance in the fresh-water limestone, at the foot of Mount Gergovia, in Auvergne.

Art. III. *Sketch of a Natural Calendar of Coincidence, with Preliminary Remarks.* By the Rev. W. T. Bree, M.A.

Sir,

Our forefathers, I am inclined to think, paid more attention to the periodical occurrences of nature, as guides for direction in their domestic and rural occupations, than perhaps we of the present day are accustomed to do. They seem to have referred to the book of nature more frequently and regularly than to the almanack. Whether it were, that the one, being always open before them, was ready for reference, and not the other, certain it is that they attended to the *signs of the seasons*, and appear to have regarded certain natural occurrences as indicating and reminding them of the proper season for commencing a variety of affairs in common life. The time was, perhaps it is not yet gone by, when no good housewife would think of brewing when the beans were in blossom. The bursting of the alder buds, it was believed, announced the period at which eels begin to stir out of their winter quarters, and therefore marked the season for the miller or fisherman to put down his leaps, to catch them at the wears and floodgates. The angler considered the season at which tench bite most freely to be indicated by the blooming of the wheat; and when the mulberry tree came into leaf, the most cautious gardener judged that he might safely commit his tender exotics to the open air, without apprehension of injury from frosts and cold. Then there was a variety of old sayings or proverbs in vogue, of a corresponding character, such as,

"When the sloe tree is white as a sheet,
Sow your barley, whether it be dry or wet."

"When elder is white, brew and bake a peck,
When elder is black, brew and bake a sack."

"You must look for grass on the top of the oak tree," &c.

People talked of "the cuckoo having picked up the dirt," alluding to the clean state of the country at the time of the arrival of the cuckoo; and of "blackthorn winds," meaning the bleak north-east winds, so commonly prevalent in the spring, about the time of the blowing of the blackthorn. Virgil, in the recipe he gives in the fourth Georgic for the production of a stock of bees, states that the process is commenced

> "Ante novis rubeant quam prata coloribus, ante
> Garrula quam tignis nidum suspendat hirundo;" *

and Shakspeare, in his *Winter's Tale*, speaks of

> ——— "Daffodils,
> That come before the swallow dares, and take
> The winds of March with beauty."

I seldom read a Number of your Magazine without meeting with some hint or other, which serves to suggest something else to my mind: and this, I may remark by the way, is no inconsiderable advantage of a miscellany like yours; the notices and observations of one naturalist serving to draw forth those of another, which, but for this circumstance (if they had not soon been forgotten even by the observer himself), at least might never have been recorded, and thus many an interesting thought might have been suffered to "pass in smother."

I have been led into these general remarks, however foreign they may be deemed from the subject I have in view, by some observations of your correspondents. In an interesting paper on British Snipes (Vol. II. p. 143.), H. V. D. says, "I am convinced, from the observation of several years, that their (the snipes') return is much regulated by the state of the atmospheric temperature, inasmuch as that return is consistent with the flowering of certain wild plants, which is retarded or forwarded precisely as the spring happens to be cold or warm. For instance, in the latter parts of the month of February the little *D*ràba vérna is seen opening its flowers on old walls and banks with a southern exposure; at that time I have invariably observed that a few snipes (the advanced guard of the main body) are to be found in our marshes. When I notice (about the second week in March) the *R*anúnculus Ficària and the *V*iola odoràta in blossom, I am then confident of finding diversion in the pursuit of snipe-shooting. By attending to these coincidences, a Norfolk sportsman will rarely be disappointed in his expectation of amusement at this time of the year, if (as I before observed) a west or south-west wind should prevail." † Prior in order of publication, and more immediately connected with my present purpose, are some remarks by Mr. Lees (Vol. I. p. 200.), who suggests the idea of forming "a calendar by which the flowering of a plant should acquaint us with the appearance of a bird, and the appearance of an insect tell us the flowering of a plant." The plan proposed by Mr. Lees strikes me as one full of interest to a lover of nature. Something of the kind, some affinity, connection, or coincidence, between the several occurrences in one department of natural history and those in another, must almost unavoidably have presented itself to the mind of the most transient observer. I wish you, or some one of your correspondents, would take the hint, and construct such a calendar. In the mean time, till some one better qualified for the task presents himself, I beg to offer to your notice the following sketch, by way of specimen. Of course a calendar of this kind may be filled up and enlarged to almost any extent. The following is proposed as a mere outline, I am aware a very imperfect one, of the sort of thing intended, and contains only a few of the different occurrences in nature, which happen to have more particularly and forcibly struck my own mind as coinciding with each other. When I speak of such natural occurrences *coinciding*, it is not meant that they fall exactly on the same day of the month; it is quite enough for our purpose, if they take place *about the same time*, if the things placed parallel to each other in the two columns are usually in season together. The arrival and departure of birds, the appearance of insects, and the flowering of plants, will in each year depend, in some degree, on the weather; and a variation of at least a fortnight or more may fairly be calculated upon, according to the forwardness or backwardness of the season. No greater precision of date, therefore, is attempted, than such as may be attained by noting the beginning, the middle, and the end of the month. The Linnean names of insects are for the most part employed below, which being generally understood, and perhaps more popular, seem better adapted to the present purpose, than the improvements of modern nomenclature.

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* "Before the meadows blush with recent flowers,
And prattling swallows hang their nests on high." *Trapp's Trans.*

† See also some interesting remarks from Mr. Templeton, Vol. II. p. 307.

I am, Sir, yours, &c.

Allesley Rectory, Sept. 25. W. T. Bree.

In the following Calendar, beg. mid. end, stand for the beginning, the middle, and the end of the month; ap. appears; fl. flowers.

January.

Mid.	Earthworms lie out	*H*elléborus nìger fl.
	*P*halæ̀na primària	Galánthus nivàlis fl.
End.	Titmouse sings	Hazel catkins open.
	*A*pis mellífica ap.	*H.* hyemàlis (Eránthis h.) fl.

FEBRUARY.

Beg.	Chaffinch sings	*Cròcus vérnus* fl. *Dáphne Mezèreon* fl.

MARCH.

Beg.	Lambs born	*Prímula vulgàris* fl.
	Rooks begin to build	*Vìola odoràta* fl.
Mid.	*Papílio rhámni* ——— *urtìcæ* ——— Polychlòros ——— C. álbum ——— I*o.*	Apricot fl.
End.	Frogs spawn	*Cáltha palústris* fl.

APRIL.

Beg.	*Cicindèla campéstris* ap.	Blackthorn fl.
	Apis terréstris ap.	*Sàlix càprea* fl.
	Véspa commùnis ap.[*]	Hawthorn leafs.
	Apis retùsa *Bombýlius màjor*	*Anemòne nemoròsa* fl.
Mid.	*Melítta fúlva* ap.	Gooseberry and currant tree fl.
	Blackcap sings Redstart sings Nightingale sings Swallows ap.[†]	Stellària *Holóstea* fl. Prímula vèris fl. *Vìola canìna* fl. Fieldfares, redwings, and woodcocks depart.
	Papílio Argìolus ap. ——— *rápæ* ap. ——— *nàpi* ap. ——— *brássicæ* ap.	*Brássica Ràpa* (turnip) fl.
End.	Cuckoo sings[‡] *Papílio cardámines* ap.	*Cardámine praténsis* fl.

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[*] Wasps seem to delight in frequenting hawthorn hedges in the spring, as soon as the early foliage comes out. What is it that attracts them to these haunts? Perhaps they come in search of the larvæ of other insects which feed on the hawthorn. That wasps, whose ordinary food seems to be fruit, are yet occasionally insectivorous, there can be no doubt, as even in summer and autumn they may often be seen to attack and devour the flies in the windows. When they make their first appearance in spring, there is no fruit to serve them for food; probably, therefore, they may at that season feed principally on insects, and for this purpose may resort to hawthorn hedges, which abound with the larvæ of various lepidopterous insects.

[†] Swallows and other summer birds come to us, as it were, in the room of our winter visitants, the woodcocks, fieldfares, and redwings. When the former come, the latter depart, and vice versâ. I remember an old sportsman who used to say that "the same wind which brought the swallows took the woodcocks away;" and I have heard an intelligent countryman remark, alluding to the fieldfares and redwings in the spring, that "there would be no warm weather till those birds had done chattering."

[‡] The song of the cuckoo and the flight of *Papílio cardámines* (or orange-tip butterfly), it has often struck me, appear to be as nearly as possible contemporaneous. At the end of April the bird is occasionally heard, and the

May.

Beg.	Swifts ap.	Scílla nùtans fl. Galeóbdolon lùteum fl.
Mid.	Scarabæ̀us Melolóntha ap. Phalæ̀na cratægàta ap.	Hawthorn fl.
	Papílio rùbi ap.	Cístus Heliánthemum fl.
End.	Papílio Euphrósyne ap. Scarabæ̀us auràtus ap.	A'juga réptans fl. Thalíctrum flàvum fl.

June.

Beg.	Scarabæ̀us hortícola ap. Pyróchroa coccínea ap.	Rósa canìna fl.
Mid.	Sphínx stellatàrum	Delphínium Consólida fl. Jasmìnum officinàle fl.
End.	Cuckoo silent Papílio cardámines disappears	Rósa arvénsis fl.

July.

Beg.	Papílio Janìra ap. Phalæ̀na prónuba ap.	Haymaking commences.
	Papílio Pàphia ap. ——— Aglàia ap. ——— Adíppe ap.	Rùbus corylifòlius fl. Cnìcus arvénsis fl. Cnìcus lanceolàtus fl.
Mid.	Phalæ̀na Grossulària ap. ——— Vauària ap. ——— Càja ap.	Gooseberries and currants ripen.
End.	Papílio Atalánta ap.	Veràtrum nìgrum fl.
	——— cárdui ap.	Thistle down floats. Oats cut.

August.

Beg.	Swifts depart Starlings congregate Phalæ̀na libàtrix ap.	Wheat harvest commences.

September.

Beg.	Phalæ̀na antìqua ap.	Cólchicum autumnàle fl. Wall fruit ripens.
	Phalæ̀na meticulòsa (last brood) ap.	Nuts ripen,

October.

Mid.	Fieldfares ap. Redwings ap. Woodcocks come	Swallows depart.

November.

Beg.	Phalæ̀na brumària * ap.	Late-flowering asters fl.

December.

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butterfly makes its appearance, or, more usually, both early in May. It is a common remark that the cuckoo is rarely heard in July; and I have seldom seen Papílio cardámines so late as that month. Unlike many others of the same tribe, it does not linger on with us long after what may be called its proper season, but disappears at once, and is not often seen in a very faded state.

* This modestly attired little moth is found abundantly throughout the greater part of the months of November and December. Its delicate tex-

ART. IV. *Some Details respecting the Garden of Plants and the National Museum at Paris.* By MRS. R. LEE (late MRS. BOWDICH).

Sir,

I HAVE much pleasure in obeying your request, and sending you a few details concerning the Jardin du Roi in Paris, of which I have been an inmate during the last month.

I was much concerned to find that the lions, panthers, &c., with some of which I had long been acquainted, were all dead; and it is said that the classical-looking building they inhabited was unfavourable to their nature. Animals of this kind require not only warmth and shelter, but society; but in these dens a constant current of air rushes through, and the animals are totally excluded from the sight of each other. Still, however, there are some very fine bears of different species; some hyænas, one of which is very gentle, and holds his head close to the bars to be caressed; and some wolves. Among the latter is one whose hair is perfectly black, and shines like floss silk. He was brought when very young (I could almost have said a puppy), and presented to Baron Cuvier's daughter-in-law, who finding him so tame, desired he might have a dog for a companion, and be fed entirely on broth and cooked meat. Her orders have been obeyed, and the animal retains all his gentleness and docility; he never sees her but he stretches his paws through the bars to be shaken, and when she lets him loose he lies down before her, licks her feet, and shows every mark of joy and affection. In a small room, not open to public view, is a curious collection of squirrels, racoons, martens, ichneumons, and some dogs, whose monstrous birth gives them a place there, in order to aid the researches of M. Geoffroy St. Hilaire.

But the great attraction — the queen of the garden — is the

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ture and weakly form would seem to mark it as an insect ill calculated to endure the inclement season appointed as its proper period of existence. But Nature knows her own business best: and accordingly these slender creatures brave the tempestuous weather they are doomed to encounter, totally regardless of the cold, the wet, the winds, and the fogs of November and December;

> "Ingentes animos angusto in pectore versant."
>
> "These little bodies mighty souls inform!"
>
> *Trapp's Translation.*

Let it blow, or rain, or shine, there they are, sporting and dancing away under the sheltered side of banks and hedges with a resolute hardihood and perseverance that are truly admirable, apparently enjoying themselves as much as the butterfly in the sultry sunbeams of July.

giraffe, to whom I paid frequent visits. She is the only survivor of the three which left Africa much about the same time, and inhabits the large round building in the centre of the menagery, called the Rotonde. Great care is taken to shelter her from the cold, and in the winter she has a kind of hood and cape, which reach the length of her neck, and a body cloth, all made of woollen materials. She is only suffered to walk in her little park when the sun shines upon it, and if care and attention can compensate for the loss of liberty, she ought to be the happiest of her kind. She stands about 12½ ft. high, and her skin, with its light brown spots, shines like satin; but I confess I was disappointed with regard to her beauty. She looks best when lying down, or standing perfectly upright, in which posture she is very dignified; but the moment she moves she becomes awkward, in consequence of the disproportion of the hinder parts of her body, and the immense length of her neck, which, instead of being arched, forms an angle with her shoulders. When she gallops, her hind feet advance beyond those in front, and the peculiarity of gait caused by moving the hind and fore feet on the same side, at the same time, is very striking. She has great difficulty in reaching the ground with her mouth, and was obliged to make two efforts to separate her fore legs before she could reach a cistern placed on the pavement. Her head is of remarkable beauty, and the expression of her full black eyes is mild and affectionate; her tongue is long, black, and pointed. She is extremely gentle, yet full of frolic and animation, and when walking in the menagery, her keeper is obliged to hold her head to prevent her biting off the young branches of the trees. Her great delight, however, is to eat rose leaves, and she devours them with the greatest avidity. The African cows, with humps on their shoulders, who supplied her with milk during her passage to Europe, are as gentle as their nursling, and when feeding her they come and softly push your elbows to have their share. Turning from the giraffe one day, and proceeding a yard or two in order to satisfy them, I suddenly felt something overshadow me, and this was no less than the giraffe, who, without quitting her place, bent her head over mine, and helped herself to the carrots in my hand. Her keeper, named Ati, and from Darfür, is a tall well-proportioned black, and at his own request a little gallery has been erected for him in the stable of his charge, where he sleeps and keeps all his property. When in attendance he dresses in the turban, vest, and full trowsers of his country, but when he walks into Paris he assumes the European costume, for in his native garb all the children in the streets recognise him, and calling out, "*Ati! Ati! comment* *va la giraffe?*" hurt his consequence. He is to be found every Sunday evening at one of the Guinguettes in the neighbourhood, dancing with all his might, and during the week he devotes his leisure to the acquirement of reading and writing.

The two elephants are much grown, and with the Asiatic they do not seem to make much progress; but the African is become very interesting; she performs various salutations and manœuvres, obeys the voice of her keeper, kneels down to take him on her back, and seldom requires any other chastisement than a pull of one of her ears, which are very much larger than those of her Indian brother.

Two very beautiful aviaries have been completed since my last visit to the Jardin. The one is appropriated to birds of prey, and contains some noble specimens of owls, eagles, and vultures: among the latter is the great condor of the Andes (*Vúltur* Grýphus), which requires double the space allotted to any of the others. The second aviary contains many rare species of pheasants and other birds, and both of them have not only covered places for shelter, and stoves for heating them, but a large space covered with iron network, in which the thousands who weekly crowd to see them can watch their movements without the least difficulty. Near these are the parks appropriated to peacocks, domestic fowls, &c., and in which the crown and Numidian cranes, and the secretary bird, stalk about and dance at sunset, as if under their native skies. The various kinds of deer, the chamois, and other goats, are in high health; the beavers are thriving, as well as all the known species of lama. I was astonished at the fury with which these mild-looking animals fight; and on one occasion having caused them to be separated, I was much amused at the rage with which they pushed their noses through the railings, till they touched, though their attempts to bite were fruitless.

Without actual study, it would be difficult to ascertain the additions made of late years to the collection of comparative anatomy. Several rooms have been added since my first acquaintance with it, in 1819, and it is yearly receiving new treasures from travellers, or the efforts of Baron Cuvier, who may be said to have created this part of the establishment. The upper portion, containing the preparations in spirits, &c., separated bones, skulls, teeth, and the skeletons of the smaller animals, seems to be crowded; and the skeletons of the whales below, among the larger objects, excited my astonishment, that the whole Parisian world should have run mad after *la baleine des Pays Bas*, when those of the Jardin du Roi are nearly as large, and much more interesting, from the whalebone having been preserved, and from the correct manner in which the parts have been put together.

The collection of stuffed animals, at the first *coup d'œil*, more completely conveys an idea of its immense riches than any other portion of the establishment. To see thousands of animals in their living attitudes, so happily prepared as to appear in actual movement, and then to pause and find all still and immovable, gives an idea of enchantment which it is difficult to shake off, till increasing admiration at every step supersedes all other feelings, and till we finally turn from it lost in wonder at the magnificence of creation, and adore the mighty Hand which has formed these endless varieties, and yet bound the whole together in one common link. The division allotted to the stuffed deer, &c., has received several curious additions of the antelope kind; and there are two tufts of hair, said to belong to the tails of the grunting cow of the East, which is such an object of curiosity to naturalists, and which tufts are all that has yet been brought to Europe to prove its existence. The giraffes, camels, and oxen still stand together in this room, and the enormous basking shark has been hoisted to the ceiling. But we feel impatient to get to the birds, the arrangement of which, from their size, is more complete than can be admitted among the quadrupeds. The first cases contain the diurnal birds of prey; where the gypaetos of the Alps seems in the act of pouncing on its victim, the secretary bird appears to have walked in from the menagery, and the falcon ready to soar from the wrist of the huntsman. The owls of all countries succeed these; and passing by the splendid parrots, parroquets, toucans, &c., we stop for a long time before the *Pásseres*. In this order every idea of exquisite form, grace, delicacy, brilliancy, and harmony of colouring seems verified. The lyretails (Mænùra), the parasol birds (Cephalópterus), the lovely birds of paradise, the sugar birds, the gems of humming-birds blazing in the light, seem each to demand a whole day's admiration: and then come the Gallinàceæ, with the red-breasted pigeon, looking as if an arrow had just pierced her heart; the horned and argus pheasants, &c. The ostrich, the rose-coloured flamingo, the sacred and the scarlet ibis; the kamichi, said to bleed his sick companions with the spur upon his wing, all take their place among the Gràllæ: and next to these are the Palmípedes, from the far-famed albatross, the awkward-looking penguin, the frigate bird, the stupid boobies, to the common duck.

The two end rooms are still full of bats, quadrupeds, and monkeys. The centre of the rooms is filled with cases of Mollúsca of the rarest and most beautiful species, both fossil and recent; the animals preserved in spirits occupy some of the lower shelves; the rest are filled with corallines and sponges; the cases above are lined with insects.

Descending the staircase, we pass through those mighty ruins of former ages, the fossils, chiefly collected by Baron Cuvier; after which come the rocks and minerals. The reptiles, which cover the sides and ceilings of the next apartment, have lately been much extended; and the former library having been appropriated to ichthyology, the books have been moved to the rooms of a deceased professor, and their place is now wholly occupied by fishes. Below these are three entirely new rooms, formed by turning the porter of the gate in the Rue du Jardin du Roi out of his habitation, and converting that and some lecture rooms into a gallery for the heavier quadrupeds, such as elephants, hippopotami, &c., on the ground floor.

The galleries of botany are scarcely big enough to contain the piles of dried plants brought home by the naturalists of the expeditions of discovery; and the collection of woods and dried seeds bids fair very soon to exceed the limits assigned to it. The School of Botany, so beautifully arranged according to the natural system, is three times as large as it was six years back. The wet summer has much injured the parterres; still, however, the daturas have been placed outside the greenhouses; the salvias, amounting to large shrubs, were still in blossom; and the flower-garden, the garden of naturalisation, and the medicinal parterres, were all blooming. In short, with the exception of living Carnívora, every department of this wonderful establishment has made the most astonishing progress, even within the last few years, and is now so perfect that we almost wish the treasures of nature exhausted, for fear the least alteration for the reception of additions should be detrimental to its beauty.

I cannot suppose it possible for an English amateur of natural history to turn from this little world of science and wonder without a sigh of regret—without dwelling on the causes, whatever they may be, which keep his own country in such deep arrears in this respect. That England, which perfects not only her own undertakings, but the undertakings of other nations, with a hundred fold the opportunity in her commercial connections, which preclude even the necessity of sending out travellers on purpose—that England should be thus outdone by her less enterprising neighbour, is a fact at which I cannot help grieving, but which I do not presume to investigate. I am, Sir, &c.

27. *Burton Street, Nov.* 19. S. LEE.

Art. V. *Observations on the Preternatural Growth of the Incisor Teeth, occasionally observed in certain of the Mammàlia rodéntia.* By W. Farrar, Esq. M.D.

Sir,

There is at present deposited in the museum of the Barnsley Literary and Philosophical Society, a stuffed wild rabbit which is a fine example of this circumstance. As it differs from all of those described by Mr. Jenyns, perhaps the following notice of it may not be superfluous.

The lower incisors and the left upper one (supposing the rabbit facing you) are precisely of the same length, and measure 1¾ in.; the right upper one is only half the length of the others, but appears to have been broken. The lower incisors begin to divide about an inch from the gums, and are separated at their summits one fourth of an inch; the upper ones diverge considerably more; the longest follows the direction of the lips, and after completing three parts of an exact circle reenters the gum. The broken one extends beyond the mouth; the posterior incisors are also much elongated, measuring three fourths of an inch.

This specimen seems to corroborate Mr. Jenyns's argument, that the disease may originate from other causes, as well as from the injury or loss of any single incisor. In this instance, I think it must be attributed to some derangement of the jaws, by which the incisors have been thrown out of contact, as the morbid growth evidently commenced in all the teeth at the same time. I am, Sir, &c.

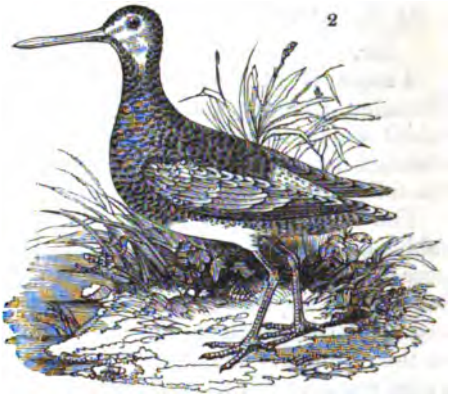
Barnsley, June 2. 1829. W. Farrar.

Art. VI. *Supplement to the "Descriptive and Historical Notice of British Snipes," in the Seventh Number of the Magazine of Natural History.* (Vol. II. p. 143.) In a Letter to the Conductor. By S. T. P.

Sir,

Every admirer of natural history will agree with your correspondent H. V. D. on the value of complete histories of families of animals, and I venture to accept his invitation to naturalists and sportsmen, being myself a little of both, to communicate, through the medium of your excellent Magazine, a short notice of two snipes, which, from their extreme rarity, have not probably come under that gentleman's observation, and which will, as far as I am acquainted, complete the enumeration of the British species of the genus Scólopax, as at present constituted.

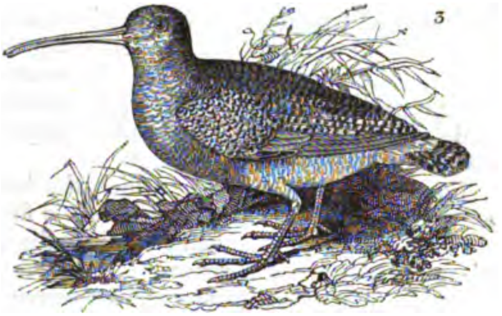
The first of these two, in order of dates, is the Scólopax grísea of Montagu's *Ornithological Dictionary.* (*fig.* 2.) A specimen of this bird was killed in Devonshire in the month of October, 1801: the length of the bill 2½ inches; whole length of the bird 11 inches; weight 3¼ oz. The head, neck, breast, and wing coverts, are ash-coloured brown, without spots, with a streak of the same colour from the base of the beak to the eye; above the eyes, the throat, belly, and thighs, pure white; the flanks white, varied with light brown; back and scapulars light brown, each feather having a darker brown edge; rump, upper and under tail coverts, white, marked across with black bars; tail feathers also crossed with narrow black and white bars alternately. This specimen is now in the British Museum, and a good representation of the bird, in this its winter plumage, will be found in Montagu's *Supplement* to his *Ornithological Dictionary.*



In its summer plumage this snipe bears considerable resemblance to the knot (Trínga Canùtus) at the same season of the year. The top of the head, nape of the neck, back, and scapulars, are then irregularly varied with black, reddish brown, and yellow; the space round the eye bright red; front of the neck and breast chestnut brown; wing coverts ash-coloured, and edged with white; the belly, rump, and tail, the same as in winter.

An excellent representation of this bird, in its summer plumage, will be found in the seventh volume of Wilson's *Ornithology of America,* under the name of Scólopax noveboracénsis (pl. 58. fig. 1.), with a description at p. 45. The bird appears to be common in that country, while with us it is so rare that M. Temminck, in the second edition of his *Manual of Ornithology* (vol. ii. p. 682.), says that he is only acquainted with two instances of this species having been killed in Europe; once in England, and once in Sweden. To these I am able to add a notice of one other instance; a very fine specimen, in summer plumage, having been lately shot near Yarmouth, for which, I understood, two guineas were immediately given by a collector in the neighbourhood.

The next species is the Scólopax Sabìni of Mr. Vigors, the secretary to the Zoological Society (*fig.* 3.); the first record of which bird appeared in the fourteenth volume of the *Transactions of the Linnean Society*, with a figure nearly, if not quite, of the natural size.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The length of the bill in this species is $2\frac{7}{16}$ inches; the whole length of this bird $9\frac{8}{10}$ inches. The general colour of the plumage is dark brown, spotted and barred with lighter chestnut brown. The first example of this species, which appears not to have been previously known to ornithologists, was shot in August, 1822, in the Queen's County, in Ireland. This specimen is in the Museum of the Zoological Society, in Bruton Street. A second example was shot on the banks of the Medway, near Rochester, in October, 1824, and is now in the collection of Mr. Dunning of Maidstone. A third specimen has been lately mounted by a London bird-preserver; and during the last winter, a fourth example of this species was shot by a nobleman upon his own estate in Hampshire.

There is a peculiarity in the beak of all the species of the genus Scólopax which deserves notice. If the upper mandible be macerated in water for a few days, the skin or cuticle may be readily peeled off, and the bones thus laid bare exhibit an appearance of which *fig.* 4. is a magnified representation from the upper mandible of the common snipe (Scólopax Gallinàgo). The surface presents numerous elongated hexagonal cells, which afford at the same time protection and space for the expansion of minute portions of nerves supplied to them by two branches of the fifth pair, and the end of the bill becomes, in consequence of this provision, a delicate organ of touch to assist these birds when boring for their food in soft ground; this enlarged extremity of the beak, which it will be recollected is a generic distinction, pos-

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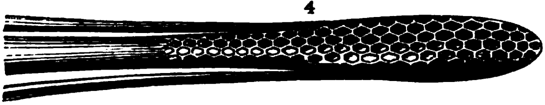


sessing such a degree of sensibility as to enable these birds to detect their prey the instant it comes in contact with it, although placed beyond the reach of sight.

Allow me to add, also, an explanation of that particular portion of the intestine of the woodcock called the appendix, and marked letter *b* in your Seventh Number (Vol. II. p. 146. fig. 33.), and also shown as appertaining to the same parts in the snipes, but not referred to; the nature and use of which, though probably well known to your correspondent H. V. D. and his medical friend, may not be equally understood by many of your numerous readers.

Some of the processes by which the human fœtus, as well as that of the Mammàlia in general, is formed, exhibit peculiarities similar to those employed in the bird, but in others there are essential differences.

In the first named instances, one source supplies both nourishment and aeration: in the egg of a bird the embryo receives nourishment from one source, aeration from another. During the last fifteen days of incubation in the common fowl, the yelk, mixed with a small portion of albumen, gradually passes into the body of the chick by a canal, of which this appendix has formed a part. On the twentieth day, the whole of the remains of the yelk and its investing membrane will be found within the abdomen of the chick; and the membranous tube connecting the capsule of the yelk with the intestinal canal of the young bird, having performed its destined office, becomes obliterated and almost entirely absorbed, leaving only the appendix marked *b* as a rudiment pointing out the precise point of termination in the intestine. This canal is the *ductus vitello intestinalis* of authors, and its rudiment varies in size in different species: it is large in the woodcock, snipe, and curlew, but small generally in the rapacious, passerine, and gallinaceous birds. I am, Sir, &c.

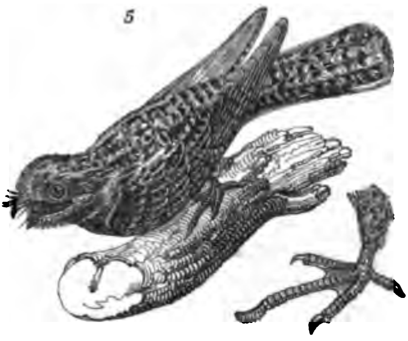
S. T. P.

Art. VII. *On the Caprimúlgus europæ̀us, or Fern Owl.* (fig. 5.)

By Bartholomew Dillon, Esq.

Sir,

I am convinced there is no circumstance connected with the exposition of the history of any animal that you will consider unimportant; and, since the time of Mr. White of Selborne, there has not been, that I am aware of, any new fact, except one, added to his history of the fern owl. His account, certainly an interesting one, is that which all of our subsequent naturalists have, perhaps too lazily, adopted; and, seemingly without any further investigation, as if the subject were already exhausted, have so fully contented themselves with its acceptation, that they have not even attempted to perfect the suppositive part of his narration. It is in favour of Mr. Selby I would make the exemplary exception adverted to; for, as far as I know, he was the first to announce that "the bristles lining the edge of the upper mandible are capable of diverging or contracting, by means of muscles attached to their roots." The peculiar haunts and habits of the bird must not, however, be forgotten, as they are such as render fair opportunities of close observation very infrequent.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The points to which I am, at present, desirous of drawing attention, are the length of the tarsus, the structure of the foot, and the use of the middle claw — the serrated one.

The tarsus is *short*, comparatively, *very* short; in this circumstance closely resembling, but shorter than, the cuckoo's.

The toes are four in number; three anterior, and one usually denominated the *hind* toe, but which really is not so, being situated *laterally*, or as a man's thumb. It is very well known that the bird is not, strictly speaking, a *percher;* that he never sits *across* a twig; but whenever observed in a tree is always seen resting *longways* of a branch, and with his head *lowermost*, as I conceive, the better to destroy his insect prey, while on the alert. In Mr. Bewick's otherwise accurate figure, the bird is shown in a perching attitude, and thus at variance with his own description; he has also drawn the foot with a *hind* toe, rather than a *lateral* one: and precisely the same things may be said of the figure and description in Graves's *Ornithology;* but the foot of his bird is very ill represented. The artists, probably, conceived it necessary to exercise, what they considered, in these cases, a harmless liberty of sacrificing *truth* to *effect;* just as the elephant is always drawn, and even by Bishop Heber himself, who was yet aware of the fact, that the animal's motion is very different from that of the horse, as the elephant moves both feet on the same side at once. (See his *Journal*, 4to edition, p. 29., and plate, "Travellers and Peasantry in the Kingdom of Oude," facing p. 341. vol. i.)

It will now appear sufficiently obvious, that the particular posture of the bird has reference to his immediate convenience, and, in fact, that it is the natural and only comfortable one in which the bird could remain in such a situation, by reason of the foot being so adapted by an express provision in its structure.

Of the three anterior toes, the *middle one* is the longest, and, in comparison with the others, *very* long, say disproportionately so. The middle toe is also provided with a claw differing from all the rest; it is somewhat flat, slightly curvilinear outwards, and serrated on the concave edge, something like a sickle placed flatways with its point outwards. In the introduction to Bewick's *British Birds*, edit. 6. p. xxxvii., there is a figure of the *right* foot, which is quite correct in every particular, except the serrated claw, and that is represented as bending downwards like the other claws. Here the *lateral toe* is very intelligibly shown.

I consider the foregoing remarks in a great degree necessary to enable us to conduct the remaining enquiry with clearness and advantage. And now, what is the use of the middle claw?

Mr. White says, there is no bird whose manners he had studied more, than those of the Caprimúlgus; and on the 12th of July, 1771, he had a fair opportunity of contemplating the motions of one as it was playing (or, as I suspect, hawking) round a large oak that swarmed with Scarabæ̀i solstitiàles, or fern chafers. He continues: "The powers of its wing were wonderful, exceeding, if possible, the various evolutions and quick turns of the swallow genus." But the circumstance that pleased him most was, that he saw it distinctly, more than once, put out its short leg while on the wing, and, by a bend of the head, deliver somewhat into its mouth. "If it take any part of its prey with its foot," says he, "as I have now the greatest reason to suppose it does these chafers, I no longer wonder at the use of its middle toe, which is curiously furnished with a serrated claw." Then the leg, foot, and claw, Mr. White supposes, were designedly constructed to assist the bird in the capture of its insect food. But it is worthy of remark, he only supposes this; he did not observe the act. It is the more important to bear this distinction along with us, as he was a most acute observer, and faithful narrator of facts; and, indeed, never more so than in the present instance. His description of the particular action of the bird is incontrovertibly true; the putting out of the leg is always accompanied by a simultaneous bend of the head, but I never could discover the "delivery of somewhat into its mouth." Besides, i occurs to me, if such were the fact, a two-fold action of the leg would become necessary; one when it is first struck out to seize the insect, and another to convey it into the mouth; and in such case, there would be one such motion of the leg unaccompanied by the bend of the head: but we shall always find that, whenever the leg is so put out, the head is at the same instant bent towards it; they move together, and the manœuvre is quickly performed.

Very different from this is the purpose wherein I consider its chief use consists, which is simply to comb or dress out the vibrissæ (*vibro*, to shake or move nimbly; bristles). For this employment (and, in my opinion, it is no mean one in the economy of this bird) the entire mechanism of the leg, foot, toe, and claw, is adapted with a wonderful precision; but, for the other purpose, there does not appear the least suitability whatever. Even the direction in which the claw is bent peculiarly unfits it for an instrument to seize with; while it expressly is the very thing that fits it for a *comb:* and that the bird needs such an instrument, will scarcely be disputed; for it is easy to imagine how, in various ways, the vibrissæ may get bent, or clotted together at their points, so as to interfere with the regular muscular action at their bases. Moreover, these vibrissæ form no very unessential part of the apparatus which is unquestionably formed for the express purpose of capturing food, the mouth: the bird is seen to exercise it for that purpose, he hawks about with its spacious cavity wide exposed, and can with much more ease extend it in any required direction farther than his leg would reach to. Examine the bird, and you will instantly pronounce the mouth complete for this end; the bird needs no additional help, he cannot have a better, and least of all does his foot supply it.

Lest it might be thought of me that I am presuming too far, because in this matter it is very difficult to decide from observation, as the motions of the bird are so quick, and the light unfavourable by reason of the hour of the evening, and the shade of the trees generally, I think I have seen the bird several times use his foot as I have described; I am almost sure my eyes cannot have deceived me.

I begin to perceive that I shall be trespassing upon your limits, but, I hope, neither in an uninstructive nor unentertaining manner, and will reserve my further observations for some future occasion, if I am not considered a troublesome and unprofitable correspondent. I am, Sir, &c.

Wrexham, Nov. 17. 1828. BARTHOL. DILLON.

Art. VIII. *On the Autumnal Migration and Habits of some of the Genus Sȳlvia in England.* By J. D. Hoy, Esq.

Sir,

Considering that any facts which might tend in any way to elucidate the natural history of our island, might not be unacceptable to you, I send you a few observations I have made on the autumnal migration and habits of some of the genus Sȳlvia.

The arrival of this elegant and interesting tribe of birds in the spring is immediately made known to us by the variety and sweetness of their notes, which enliven our groves and fields, and by which they at once appear filled with a new creation; but after the great work of rearing their young has been accomplished, and the warmer season is drawing to a close, they imperceptibly steal away from us. The nightingale (Sȳlvia *L*uscínia) remains with us in small numbers, frequenting gardens, bean fields, and thick hedge-rows, sometimes until the end of September; a great number leave us in the end of August or beginning of September. They may be known, when you approach them, by their shrill call-note and croaking note of alarm; I have, on several occasions, heard them sing a few notes in a low suppressed tone. The redstart (S. *P*hœnicùrus) appears to quit in considerable numbers in the end of August, particularly the old birds, last seen about the 20th of September. The wood wren (S. sibilàtrix) leaves in the beginning of September, as do the greater number of the willow wrens (S. *T*róchilus); a few of the latter remain to the middle of the month. The willow wren will sing a little on fine warm days, but the lesser willow wren, or chiff-chaff (S. hippolàis), pours forth its singular and cheering notes, frequently for hours together, many days before it take its departure. This hardy little bird lingers with us not unfrequently to the middle of October, or later, frequenting gardens and fir plantations, where you will find it in company with the titmice, or crested wrens. The common and lesser whitethroats (S. cinèrea and S. Sylviélla) I have not seen later than the 24th of September; those that remain with us to that time frequenting hedges where blackberries abound, of which they are very fond; the great flight appear to leave in the beginning of the month. I have seen the grasshopper warbler (S. Locustélla) as late as the 5th of September; the last time of hearing its sibilous note the 23d of August. If you approach this bird suddenly, it has a curious jerking of the tail as it retreats from you, most frequently running on the ground. The reed and sedge warblers (S. *a*rundinàcea and S. salicària) have mostly left their breeding places by the end of August; and about the middle of September, when they have left our district, you will find many of them congregated in large reedlings near the coast.

The blackcap and greater pettychaps (S. Atricapílla and S. horténsis) leave from the end of August to the 8th or 10th of September; a few blackcaps remain until the end of the month. I have heard the blackcap singing in low inward notes about the middle of September. The whin-chat (S. Rùbetra) has been said to winter with us, only shifting its situation. I have never seen this bird in autumn after the beginning of October, and the greater number have retired much before that time; nor earlier in spring than the middle of April, in the forwardest seasons. The wheatear (S. Œnánthe) I have seen later in autumn, and much earlier in spring, than S. Rùbetra. And lastly, that diminutive fairy little bird, the golden-crested wren, although indigenous with us, changes its situation occasionally; and in autumn, in some seasons, I believe, many arrive on our coast from the north; they are often caught on board vessels many miles from land, flying to the lights. In small copses and fir plantations near the coast, where, perhaps, the day before scarcely a bird was to be seen, you will sometimes meet with this bird in great numbers; which, with the fact of their often being caught at sea, argues strongly in favour of a partial emigration. I am, Sir, &c.

J. D. Hoy.

Stoke Nayland, Nov. 27.

Art. IX. *On the wanton Destruction of Swallows.*

By Philochelidon.

Sir,

One of your correspondents (Vol. I. p. 288.) suggests the idea of the legislature interfering to prevent bird-catchers from exercising their art within twenty miles of the metropolis. I am not going to discuss the merits or the practicability of such a measure, but I do wish that a penalty, and no very light one, were enacted against a much worse practice, viz. the wanton destruction of those harmless and useful creatures, the swallows. Hear, upon this subject, the sentiments of a modern writer*, whose kind feelings do credit to him as a man. "The sportsman's essaying his skill on the swallow race, that 'skim the dimpled pool,' or harmless glide along the flowery mead, when, if successful, he consigns whole nests of infant broods to famine and to death, is pitiable indeed! No injury, no meditated crime, was ever imputed to these birds; they free our dwellings from multitudes of insects; their unsuspicious confidence and familiarity with men merit protection, not punishment, from him. The sufferings of their broods, when the parents are destroyed, should excite humanity, and demand forbearance. I supplicate from the youthful sportsman his consideration for these most innocent creatures."

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* See Journal of a Naturalist, p. 226., first edition.

I have frequently heard the remark made of late years, "How few swallows we have this season!" May not the deficiency be owing in some measure to the detestable practice here alluded to? The followers of this unmanly sport will, perhaps, take up their defence, and say that they pursue it with a view to practise and improve their skill as marksmen: but I have known those who, after slaughtering the inoffensive swallows and swifts in great numbers, could yet give but a poor account of the partridges on the 1st of September; and the reason is, that a far greater degree of coolness and self-possession, prime requisites in the formation of what is called a good shot, is exercised in the one case, than in the other. The young sportsman levels his tube with deliberate composure at the passing swallow or the swift, while he is apt to be hurried and unnerved by the rush and bustle of the rising covey. The shooting of swallows, therefore, for practice, does not advance the sportsman's skill so much as at first sight might be supposed: but, if it did, the positive good these creatures do, the beneficial services they perform for us by clearing the air of innumerable insects, ought to render them sacred, and secure them from our molestation. Without their friendly aid, the atmosphere we live in would scarcely be habitable by man. They feed entirely on insects, which, if not kept under by *their* means, would swarm and torment us like another Egyptian plague. The immense quantity of flies destroyed in a short space of time by one individual bird, is scarcely to be credited by those who have not had actual experience of the fact. I was once present when a swift was shot,—I may as well confess the truth,—I was myself (then a thoughtless youth) the perpetrator of the deed: I acknowledge the fault in contrition, and will never be guilty of the like again. It was in the breeding season, when the young were hatched; at which time the parent birds, it is well known, are in the habit of making little excursions into the country to a considerable distance from their breeding places, for the purpose of collecting flies, which they bring home to their infant progeny. On picking up my hapless and ill-gotten prey, I observed a number of flies, some mutilated, others scarcely injured, crawling out of the bird's mouth; the throat and pouch seemed absolutely stuffed with them, and an incredible number was at length disgorged. I am sure I speak within compass when I state that there was a mass of flies, just caught by this single swift, larger than, when pressed close, could conveniently be contained in the bowl of an ordinary table-spoon! Thus was a whole brood of young birds deprived of one of their nursing parents, by an act of the most wanton cruelty! In common with the excellent author above quoted, I would entreat those who follow the manly sports of the field to spare these guiltless creatures, if it were only from motives of self-interest. The blackbird and the throstle, the blackcap, whitethroat, and a variety of other birds, are of service in destroying insects, and they charm us with their melody and amusing habits; but, in return for all this, we are obliged to "*pay the piper.*" As a compensation for their song, they take great liberties with our fruit and vegetables, and we are content to submit to their committing considerable depredations on our gardens; but the swallows, the inoffensive swallows, what mischief do *they* do? They rank among our best friends; "*no injury, no meditated crime, was ever imputed to these birds;*" they do us good, and, unlike many others of the feathered race, good only, good unmixed with evil. During their sojourn in this country, they are (with the exception of one species, the sand marten) always about our dwellings, and appear, as it were, to court our acquaintance. It has been somewhere observed, I think, by White, that "they are hardly to be scared by a gun," so unsuspicious are they of receiving injury from man, whom they seem to look upon as their natural protector. The arrival of the first swallow is regarded with some degree of interest by most people; and, as he skims along with graceful flight, or twitters on our chimney tops, is hailed even by the uncultivated plebeian as the constant and uniform attendant on spring. The scream of the swifts, when they collect in packs, and

> "Dash round the steeple, unsubdued of wing,"

harsh and discordant as it may be, is yet a most joyous and delightful sound, and is associated with all the charms of summer days and serene weather. And as to those industrious little masons, the martens, I love to have them build in my windows; I consider they pay me a compliment by making a selection of my premises for the purpose of nidification, and would on no account have them injured or disturbed, notwithstanding their occasional dirt and litter. If our great poet is to be believed, and, being "Nature's child," he was no inaccurate observer of her ways, the occurrence of this bird at any place in more than ordinary numbers is a symptom of the fineness and salubrity of the air:—

> ——— "This guest of summer,
> The temple-haunting martlet, does approve,
> By his loved mansionry, that heaven's breath
> Smells wooingly here. No jutty, frieze,
> Buttress, nor coigne of vantage, but this bird
> Hath made his pendent bed and procreant cradle.
> Where they most breed and haunt, I have observed
> The air is delicate." *Macbeth.*

From the quotations already made in defence and recommendation of our British *H*irúndines, you will perceive, Mr. Editor, that I am, as Sir Henry Wotton says, "but a gatherer of other men's stuff, at my best value." Availing myself, therefore, of my privilege, I trust I shall have your pardon, if not your thanks, for concluding my remarks with another extract from a modern writer, which, for its truth, beauty, and vivacity, cannot easily be surpassed or equalled. "I delight in this living landscape! The swallow is one of my favourite birds, and a rival of the nightingale; for he glads my sense of seeing, as much as the other does my sense of hearing. He is the joyous prophet of the year, the harbinger of the best season; he lives a life of enjoyment amongst the loveliest forms of nature; winter is unknown to him, and he leaves the green meadows of England in autumn, for the myrtle and orange groves of Italy, and for the palms of Africa: he has always objects of pursuit, and his success is secure. Even the beings selected for his prey are poetical, beautiful, and transient. The ephemeræ are saved by his means from a slow and lingering death in the evening, and killed in a moment, when they have known nothing of life but pleasure. *He is the constant destroyer of insects, the friend of man; and, with the stork and the ibis, may be regarded as a sacred bird.* His instinct, which gives him his appointed seasons, and which teaches him always when and where to move, may be regarded as flowing from a Divine Source; and he belongs to the oracles of nature, which speak the awful and intelligible language of a present Deity."*

After this glowing and inimitable passage, any further remarks from me would be worse than superfluous; I beg, therefore, to subscribe myself. Yours, &c.

Nov. 23. 1829. PHILOCHELIDON.

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* Salmonia, p. 79.

ART. X. *An Introduction to the Natural History of Molluscous Animals.* In a Series of Letters. By G. J.

Letter 3. *Indirect and Direct Benefits.*

Sir,

IN my last letter I illustrated, at some length, one grand use of the Mollúsca in the economy of nature: that, viz., of furnishing sustenance to many animals. But you will observe that a vast number of the class are themselves carnivorous, and become thus a means, in the hand of Providence, of keeping in check the multiplication of the tribes on which they prey, and of preserving between them that due proportion and "balance of power" which is as necessary in the animal, as in the political, world. Others, again, are gifted with the remarkable property of boring through stone and wood, and thus reduce to dust the rock over which the waves might have broken in vain, and remove those forests which the torrents and tornadoes of tropical climes annually float to the sea. In this sense, even the "fell *Terèdo*" ministers to good. "The seaman," to adopt the rather pompous language of a very excellent author, "as he beholds the ruin before him, vents his spleen against the little tribes that have produced it, and denounces them as the most mischievous vermin in the ocean. But a tornado arises, the strength of the whirlwind is abroad, the clouds pour down a deluge over the mountains, and whole forests fall prostrate before its fury. Down rolls the gathering wreck towards the deep, and blocks up the mouth of that very creek the seaman has entered, and where he now finds himself in a state of captivity. How shall he extricate himself from his imprisonment? an imprisonment as rigid as that of the Baltic in the winter season. But the hosts of the *Terèdo* are in motion: thousands of little augers are applied to the floating barrier, and attack it in every direction. It is perforated, it is lightened, it becomes weak; it is dispersed, or precipitated to the bottom; and what man could not effect, is the work of a worm. Thus it is that nothing is made in vain; and that, in physics, as well as in morals, although evil is intermingled with good, the good ever maintains a predominancy." *

The conversion, through their agency, of other materials into lime, seems, however, to be the great purport of the creation of molluscous animals. Shells consist of carbonate of lime with a greater or less proportion of animal matter, and the animals form these shells from their food, which contains a very little lime, or perhaps none at all. If you ask me how this can be, I can only answer that it is one of the wonderful and inexplicable effects of a living principle. But the fact being as I have stated, you will readily grant that such a gift was not likely to be bestowed for a minor purpose; and though we cannot unfold all the uses of this metamorphosis of matter, yet we know enough to prove its vast importance. "Chalk, marl, and limestone," says Buffon, "consist entirely of the dust or fragments of shells." * This, at first, may seem an extravagant doctrine, and Imagination herself startles when she attempts to sum up the millions and tens of millions which must have gone to the formation of such deep and extensive strata. It is nevertheless, in a great measure, true †; and, as a proof of it, I will have pleasure in showing you, when next you visit me, strata of limestone, some miles in extent, and many feet deep, composed almost wholly of shells, thousands of which are so well preserved, that you may give them a "local habitation and a name" in the systems of naturalists. Cast a glance at your marble chimney-piece, and you will, in all probability, trace therein the figures of shells that have been, not the sportive freaks of the formative powers of nature, as philosophers once believed, but the true remains of living creatures which "have put off flesh and blood, and are become immutable." Hence it is that the study of shells, so long ridiculed by the wits of the age, as an abuse of time and waste of money, becomes so important, or rather necessary, to all those who make the structure of the earth, and the various changes which it has undergone, an object of attention. "For shells are found in abundance in a great variety of rocks and positions: they constitute the medals of the ancient world; and, from an accurate acquaintance with their different species, and with the nature of the animals that inhabited them, many curious and important deductions respecting the formation and changes of the crust of the earth may be drawn." ‡

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* Good's Book of Nature, vol. i. p. 265.

It is from their composition that even recent shells become useful as a manure, a purpose to which they are occasionally applied in this and other countries; and it has been ascertained by comparative experiments, that, on turf lands in par-

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* Nat. Hist., vol. i. p. 214.; also vol. ii. p. 221., &c. The word shell is, however, used here in a very extensive sense, so as to include corals, madrepores, *Echini*, &c.; still it does not materially affect the text.

† "If Saussure," says Dr. Clarke, "had not discovered limestone lying beneath rocks of the most ancient formation, the French would long ago have established a theory that all the strata of carbonated lime, upon the surface of the globe, have resulted from the decomposition of animal matter deposited during a series of ages." See his Travels, vol. i. p. 624—26. 4to.

‡ Thomson's Hist. of the Royal Society, p. 83.

ticular, they act more beneficially than quicklime.* And in China, India, Ceylon, and Africa, where there is no stone fitted for burning into lime, and where shells are abundant, these are resorted to, and the lime procured from them is said to be peculiarly white and pure †: so much so, that the people, and even the ladies in India, to increase the pungency, mix it with their betel leaf and areka nut, which they chew as our sailors do tobacco. ‡

I now proceed to illustrate the modes in which molluscous animals contribute more directly to our wants and luxuries; and I shall occupy the remainder of this letter with an account of such of them as man has added to his long dietetical list, for liberally has he availed himself of the license, "every moving thing that liveth shall be meat for you." The principal of these is the oyster, "the food that feeds, the living luxury," as it is described by a living poet of celebrity, though there are some who, like the great Mr. Boyle, abhor the eating of them raw, and, with another poet, are ready to exclaim,

> "That man had sure a palate cover'd o'er
> With brass or steel, that, on the rocky shore,
> First broke the oozy oyster's pearly coat,
> And risk'd the living morsel down his throat!"

But, be that as it may, oysters are in general much esteemed, and have, for many centuries, held an eminent place amongst the delicacies of the table. The Romans, when luxury had ousted the temperance of their earlier days, preferred them to all others. "Nec potest videri satisdictum esse de his, cum palma mensarum divitum attribuatur illis," are the words of Pliny. § They sometimes brought them so far as from Britain; but those most celebrated for their sweetness and tenderness were from Cyzicus, a town of Mysia, situate in a cognominal island of the Propontis. You will also remember that those which came from the Lucrine Lake and from Brundusium had no vulgar fame, being occasionally adverted to by their poets and satirists. It was even a grave matter of dispute to which of these the preference was due; and to settle the point, or with a view, perhaps, of combining the good qualities of both, oysters were wont to be carried from Brundusium, and fed for a time in the Lucrine Lake.

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[*] Thomson's Hist. of the Royal Society, p. 65.

[†] "At Columbo, in Ceylon, the Dutch had the walls of their houses all plastered over and whitewashed with a very fine bright lime, made of burnt shells. *The colour is beautifully white*, and may contribute to the coolness of the houses, but throws an unsupportable glare in the eyes of the passenger along the streets." (*Percival's Ceylon*, p. 126.)

[‡] See the Travels of Staunton, Buchanan, and Barrow.

[§] Hist. Nat., lib. xxxii. cap 6.

Oysters abound on various parts of the British coast, and are consumed, under one form or another, in such numbers, as to have become a valuable article of commerce. To give you some idea of its extent, and of the number of hands to which it gives employment, it may be sufficient to mention the oyster-fisheries of Essex alone. In the rivers of this county, more particularly in the Crouch, the Blackwater, and Colne, a great variety of excellent oysters are bred. The boats employed in dredging them are from 14 to 30 or 40 tons; the fitting out one of 20 tons will require 150*l.* Of these vessels there are upwards of 200 now employed, and above 500 men and boys. The quantity of oysters taken in a season is supposed to be above 20,000 bushels, which are chiefly disposed of in London; but they are also sent to Hamburgh, Bremen, Holland, France, and Flanders.[*] So important, indeed, are the oyster-fisheries of Britain, that they have long been an object of attention to the legislature; and they are regulated by a Court of Admiralty. In the month of May, the fishermen are allowed to take the oysters, in order to separate the spawn from the *cultch*[†], the latter of which is thrown back, to preserve the bed for the future. After this month it is felony to carry away the cultch, and punishable to take any oyster, unless, when closed, a shilling will rattle between its valves. The spawn is then deposited in beds or layers formed for the purpose, and furnished with sluices, through which, at the springtides, the water is suffered to flow. This water, being stagnant, soon becomes green in warm weather; and, in a short time, the oysters acquire the same tinge, which renders them of greater value in the market. Three years, at least, are required to bring them to a marketable state; and the longer they remain, the more fat and delicate they become.[‡] Those artificial beds, as Pliny informs us, were invented by one Sergius Arata, and first established on the Lucrine Lake, A. U. 660; and, from some circumstances mentioned by the naturalist, we may infer that the said Sergius was no loser by the speculation. In Scotland we have none of them, but eat our oysters just as they are brought from their native rocks; and though certainly inferior to the genuine "Pyefleet," yet they are no despicable dainties.

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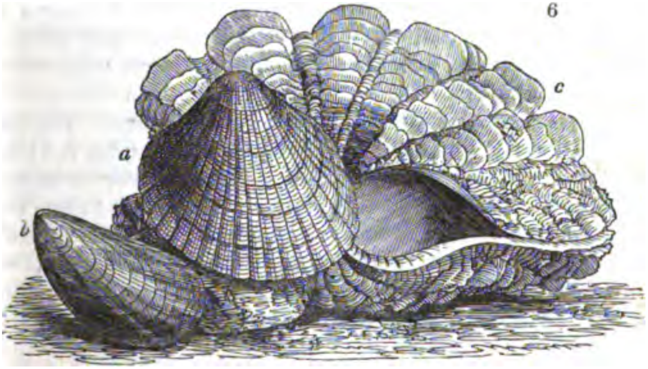
[*] Edin. Encyclopædia, art. Essex.

[†] By this term are meant the stones, gravel, old shells, &c., to which the spawn adheres; and the reason for punishing its destruction is, that, when taken away, the ooze increases, and muscles and cockles breed on the bed, and destroy the oysters, gradually occupying all the places on which the spawn should be cast.

[‡] See Pennant's Brit. Zoology, vol. iv. p. 227., &c.; Bingley's Animal Biography, art. Oyster; and Thomson's Annals of Philosophy for January, 1818, p. 70.

The oyster is a *bivalve* shell, and there are many others of this kind which are edible. Indeed, none of them, so far as we know, are positively hurtful; though some, as the *S*póndyli, are harsh and disagreeable, others occasionally act as poison at particular seasons or to peculiar constitutions, and many are so small or so rare as never to have been used. The *P*écten máximus, for example, is a much esteemed species; and the clam (*P*écten operculàris) is very commonly eaten in Scotland. The Anòmia undulàta, at Bourdeaux, is considered a delicacy; while, on some parts of the shores of the Mediterranean, the rocks are broken with large hammers, in order to procure the Phòlas dáctylus, which abounds there, and is admired even at the tables of the luxurious. The razor-fish (*S*òlen síliqua), common on our sandy shores, is an article of food in many places; and when they go to its capture, the Irish are said to have a song appropriate to the occasion, whence we may infer that it is a favourite with them. On a dish made of the animal of the *M*ỳa truncàta, and named *smurslin*, the natives of Orkney and Zetland delight to sup; and you know that, from many parts of the coast of merry England, great numbers of cockles (Cárdium edùle) (*fig.* 6. *a*) are gathered, particularly in spring; and, in autumn, an equal number of muscles (*M*ýtilus edùlis) (*b*), which are eaten roasted or pickled, or by entering into the composition of sauces, add to the *goût* of more substantial viands.



This catalogue, were it necessary, might easily be extended; but it may be sufficient, in addition, to remark that almost every shore has some species peculiar to it, or more plentiful than elsewhere, which the natives make subservient to the table. Thus, in India, the favourite food *bacassan* is prepared from the *T*ellìna *G*àri *Lin.;* and in South America they use a large muscle, 8 in. long and of excellent flavour, but the name of which is unknown to me. "They are often salted and dried; after which, they are strung on slender rushes, and, in this manner, large quantities are exported." [*] This practice reminds me of a somewhat similar one adopted by the Africans in the neighbourhood of the river Zaire or Congo. They take large quantities of a species of *M*ỳa from out the mud round Kampenzey Island, and, as in a raw state the animals are without flavour, they stick them on wooden skewers, as the French do frogs, and half dry them. They pass thus into a state of semi-putrefaction, become entirely to the taste of the negroes, and form an important object of traffic. [†] The natives of New Holland and New Zealand did, at the time of their discovery, use the *C*hàma gìgas (*fig.* 6. *c*), a very large shell, a pair of the valves of which were presented, as natural curiosities, to Francis I. by the Venetians; and which Louis XV., more zealous, as he has himself taken care to let us know, for the glory of God, destined to hold holy water in the magnificent church of St. Sulpice in Paris, where they to this day actually serve the purpose of baptismal fonts. [‡] Captain Cook tells us that it sometimes attains a size so great that two men are required to carry it; and containing full 20 lbs. of good meat, it often furnished him and his fellow-adventurers an esteemed repast. Bruce mentions the same species as being found in the Red Sea, but in this respect he is probably mistaken. The fish of *his* shell, however, are very wholesome, and have a *peppery* taste, a circumstance so much the more convenient, that they carry that ingredient of spice along with them for sauce, with which travellers seldom burthen themselves. [§]

Of the *univalved* shells I have not much to say. You may have noticed the periwinkle (Túrbo littòreus) (*fig.* 7. *a*) and common whelk (*B*úccinum lapíllus *Lin.*) exposed for sale, in large quantities, in the fish-shops of the metropolis [‖]; and they frequently furnish to the poorer classes of our sea-coast towns and villages a repast, perhaps sufficiently wholesome, and certainly not destitute of relish. But, even to them, these may be regarded merely in the light of luxuries: it is far otherwise with the still poorer inhabitants of several of the Western Isles of Scotland. Periwinkles and limpets (Patèlla vulgàta) (*b*), which so profusely stud the rocks of their shores, are their daily fare, and on which they are sometimes reduced to the necessity of altogether subsisting. In the Isle of Skye, for example, we are told that there is almost annually a degree of famine, when the poor are left to Providence's care, and prowl, like other animals, along the shores, to pick up limpets and other shellfish: " the casual repast," adds Mr. Pennant, from whom I have borrowed this melancholy account, " of hundreds, during part of the year, in these unhappy islands." *

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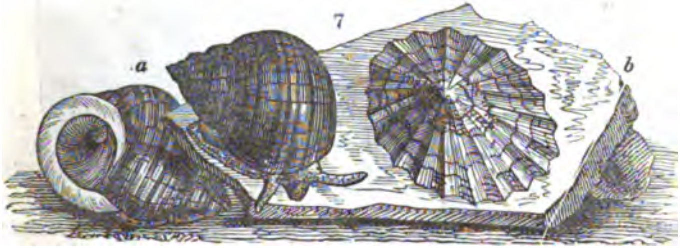
[*] Stevenson's Narrative of Twenty Years' Residence in South America, vol. i. p. 123.

[†] Tuckey's Narrative, &c., p. 55.

[‡] Smith's Tour on the Continent, vol. i. p. 82.

[§] Bruce's Travels, &c., vol. ii. p. 112.

[‖] They do not appear to have been so common in the days of Samuel Johnson. In his *Journey to the Western Islands* he says, "Here I saw what I had never seen before, limpets and muscles in their natural state." (p. 295.)



Shellfish, then, you observe, are not mere luxuries: here they become almost essential to man's existence; and, from the particulars related by Captain Cook, we cannot hesitate to admit that the natives of Australia also derive their principal subsistence from them. Wherever marks of fire were observed, there the shells of oysters, cockles, muscles, and various other bivalves, robbed of their contents, were strewed around, and sometimes in numbers scarcely credible. They apparently eat none of them in a raw state, nor do they always go on shore to dress them, for they have frequently fires in their canoes for that purpose. To the people of Terra del Fuego, shellfish are every thing. Captain Cook saw no appearance of their having any other food; " for, though seals were frequently seen near the shore, they seemed to have no implements for taking them. The shellfish are collected by the women, whose business it seems to be to attend, at low water, with a basket in one hand, a stick pointed and barbed in the other, and a satchel at their backs: they loosen the limpets and other fish, that adhere to the rocks, with the stick, and put them into the basket, which, when full, they empty into the satchel."

Of the *naked* Mollùsca, the cuttle-fish (Sèpia officinàlis, or rather Octòpus vulgàris) only has been used. This singular animal was esteemed a delicacy by the ancients, more especially when it was in a pregnant condition; and, from the high encomiums bestowed by Captain Cook on a soup he made from it, the fish would seem to merit the attention of even modern epicures. It is eaten at the present day by the Italians, and by the modern Greeks during Lent.*

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* See his Tour in Scotland and Voyage to the Hebrides, 1772.

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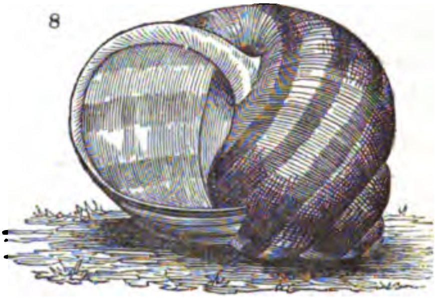

The list of the *terrestrial* species is equally short, for I remember only one, the Hèlix pomàtia† (*fig.* 8.), which has been employed as food; but it is one of some celebrity, and of which a good deal has been said. The Romans took great pains in rearing these snails. They kept them in sties called *cochleària*, which were generally constructed under rocks or eminences moistened by a passing stream. If, however, the sty was not sufficiently humid, a water-pipe, bored full of holes, like a watering-pot, was introduced, by which means it was continually sprinkled and kept in a favourable state.‡ Here the snails required little attendance or food, supplying themselves as they crawled about the sides or floor of their prison; but, when it was wished to fatten them, they were fed with bran and sodden wine; and, on this generous fare, they grew occasionally to such a size that, according to Varro, the shell would hold full ten quarts! § You need no longer hold up to imitation the temperance of the younger Pliny, whose supper consisted of *only three* snails, two eggs, a barley cake, a lettuce, sweet wine, and snow; but, alas! participating in that degeneracy which is said to characterise the human race of the present day, our snails never attain the twentieth part of the bulk of Varro's. They are still eaten in great numbers on the continent of Europe, particularly during Lent. In Switzerland, where there are gardens in which they are fed in many thousands together, a considerable trade is carried on in them about that season; and at Vienna, a few years ago, seven of them were charged at an inn the same as a plate of veal or beef. The usual modes of preparing them for the table are, either boiling, frying them in butter, or sometimes stuffing them with farce-meat; but in what manner soever they are dressed, it is said, their sliminess always, in a great measure, remains. Those edible snails were introduced into England, about the middle of the sixteenth century, by Charles Howard, of the Arundel family, and afterwards by the eccentric Sir Kenelm Digby, either as being a favourite foreign delicacy, or in order to cure his beautiful wife of a consumptive disease.* The fashion seems to have taken, for the great master-cook, Robert May, has left several receipts for dressing snails among the secrets of his fifty years' experience †; but, like other fashions, it soon passed away, for the English have no relish of such "liquorish viands." In proof of this, and as a pleasant conclusion to a long letter, allow me to transcribe for you a story from the pen of Sir Walter Scott: —

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* Pennant's Brit. Zool., vol. iv. p. 119.; and the Travels of Pallas and Clarke.

† I presume the "vine snails," which Pallas repeatedly mentions as a common food to the modern Greeks, are identical with this. He speaks of their using *nine* or *ten* other sorts, but the species are not distinguished.

‡ The cochleària were invented by Fulvius Hirpinus, a little before the civil war with Pompey the Great. (*Plin. Hist. Nat.*, lib. ix. cap. 82.)

§ "Ut cochleæ quoque altiles ganeam implerent: cujus artis gloria in eam magnitudinem perducta sit, ut octoginta quadrantes caperent singularum calices. Auctor est M. Varro." (*Plin. Hist. Nat.*, lib. ix. cap. 82.) The thing is quite incredible; but, at the same time, we may remark that a different and larger species than the H. pomàtia might be alluded to, for the Romans brought land-shells, for their stews, from different countries, and seem to have used several species.

"The chemical philosophers Dr. Black and Dr. Hutton were particular friends, though there was something extremely opposite in their external appearance and manner. Dr. Black spoke with the English pronunciation, with punctilious accuracy of expression, both in point of matter and manner. The geologist was the very reverse of this: his conversation was conducted in broad phrases, expressed with a broad Scotch accent, which often heightened the humour of what he said.

"It chanced that the two doctors had held some discourse together upon the folly of abstaining from feeding on the testaceous creatures of the land, while those of the sea were considered as delicacies. Wherefore not eat snails? They are well known to be nutritious and wholesome, even sanative in some cases. The epicures of olden times enumerated, among the richest and raciest delicacies, the snails which were fed in the marble quarries of Lucca: the Italians still hold them in esteem. In short, it was determined that a gastronomic experiment should be made at the expense of the snails. The snails were procured, dieted for a time, then stewed for the benefit of the two philosophers; who had either invited no guest to their banquet, or found none who relished in prospect the *pièce de résistance.* A huge dish of snails was placed before them: but philosophers are but men, after all; and the stomachs of both the doctors began to revolt against the proposed experiment. Nevertheless, if they looked with disgust on the snails, they retained their awe for each other: so that each, conceiving the symptoms of internal revolt peculiar to himself, began, with infinite exertion, to swallow, in very small quantities, the mess which he internally loathed. Dr. Black, at length, 'showed the white feather,' but in a very delicate manner, as if to sound the opinion of his messmate. 'Doctor,' he said, in his precise and quiet manner, 'Doctor, — do you not think that they taste a little — a very little, green?' 'D—d green, d—d green, indeed, — tak' them awa', tak' them awa',' vociferated Dr. Hutton, starting up from table, and giving full vent to his feelings of abhorrence. And so ended all hopes of introducing snails into the modern *cuisine:* and thus philosophy can no more cure a nausea than honour can set a broken limb." (*Quart. Review,* xxxvi. 197.)

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* Some years ago they were introduced into Scotland by Pat. Neill, Esq., and placed in his curious and most interesting garden at Cannonmills; but, we believe, they have not prospered, and are gradually disappearing.

† The above particulars are from the works of Pennant, Bingley, &c.; and from Southey's Omniana, vol. ii. p. 81.

I am, Sir, &c. G. J.

Art. XI. *Observations relative to Dr. Carus's Discovery of the Circulation of the Blood in Insects.* By William Spence, Esq. F.L.S.

Sir,

One of the obscurest points of the physiology of insects has always been that of the circulation of their blood. The most superficial observer of many of the large thin-skinned larvæ could scarcely fail to observe the evident regular pulsation of a fluid in a vessel running along the back, and it was naturally considered that this fluid is analogous to the blood of larger animals: but as even the microscopic observations of Swammerdam and Lyonet had never detected any thing like blood-vessels in other parts of the body of insects, a circulating system has been generally denied to this class, which in this circumstance has been thought to differ from some of the classes immediately connected with it. It was reserved for that eminent physiologist, Dr. Carus of Dresden, physician to the King of Saxony, to remove this obscurity by the interesting and important discovery which he made and published a few years ago (and the substance of which is given in an appendix to Mr. Gore's translation of his *Introduction to the Comparative*

Anatomy of Animals, 1827), of a distinct circulation of the blood in insects; and having had the advantage, within these few days, of witnessing some of the most striking facts upon which his discovery rests, which he had the goodness himself to show and explain to me, I am anxious that your entomological readers should partake of the high gratification which this interesting sight imparted to me; which any one might enjoy, who will examine some very common insects with a good compound microscope.

The first insect to which Dr. Carus directed my attention was the larva of Ephémera vulgàta (or an allied species), in which, near to the branchiæ and parallel with each side of the body, was very distinctly visible a constant current, towards the tail, of oblong globules swimming in a transparent fluid, propelled with a regular pulsating motion; and on cutting the body of the larva across near the tail, these globules were most plainly seen pushed out of the divided vessels in a distinct mass, which increased at each pulsation. I cannot express the pleasure which it gave me to see thus clearly this ocular demonstration of one of the most important physiological discoveries of modern times; and my gratification was heightened by the next object which Dr. Carus placed before his microscope, viz. a specimen of Sémblis víridis, in which precisely the same phenomena, but if possible more clearly, were seen in the nervures of the wings and in the antennæ, in both which the constant current of globules was most apparent; and in the former, the sudden turning of these globules at the apex of the wing, out of the exterior nervure into a central one, with which it joins and forms an acute angle, was equally curious and striking. On cutting off the end of the antennæ, precisely the same emission of globules (which soon assume a greenish tint) took place as in the former case, forming a mass which was increased with a sudden gush at each pulsation.

Dr. Carus has observed the same phenomena in the wings of Sémblis bilineàta, and in the elytra of *L*ampy̆ris noctilùca and *L.* itálica, as well as in the fin-like appendages at the tail of the larva of A`grion puélla, in which he first made the discovery, and in which the circulation is remarkably distinct.

The only point of manipulation in examining the specimens which it is necessary to notice is, that Dr. Carus places them on the slip of glass, not in mere water, but in a drop of pretty thick gum water, which confines their too agile movements without injuring the transparency of the medium.

I must not omit observing, that when Dr. Carus was in Italy last year, he made some new and curious observations relative to the connection which exists between the circulation of the blood in the Italian flying glowworm (*Lampỳris* itálica) and the luminous substance which occupies great part of the under side of the abdomen. When he first noticed this insect, which is so distinguished an ornament of an Italian evening, he was much surprised to find, what, strange to say, no previous observer has described, that the light kept every instant varying in intensity, being alternately much brighter than ordinary; as the flame of a candle behind a shade of horn would appear, if the seeds of Lycopòdium were from time to time thrown into it: and, after a series of experiments, he ascertained that this phenomenon entirely depends on the circulation of the blood; the greater intensity of light corresponding precisely with each pulsation of that fluid; taking place from forty-four to fifty-four times a minute, and at regular intervals, when the insect was not disturbed, but more rapidly and irregularly when it was alarmed on being first caught.*

The above discoveries of Dr. Carus suggest many topics of investigation highly interesting to the entomological and general physiologist, but into these I cannot attempt to enter; the only object of this hasty notice, written on the eve of a long journey, being to draw the attention of British entomologists to a field of enquiry equally extensive and important, and in which, even if they detect nothing new, they cannot fail to be highly gratified with observing what Dr. Carus has already described. For a full account of the discoveries of this celebrated physiologist I must refer your readers to the forthcoming new edition of his *Entdeckung eines Einfachen, Vom Herzen aus beschleunigten Blutkreislaufes in den Larven netzflügelicher Insekten*, which first appeared in 1827.

I am, Sir, &c. W. Spence.

Dresden, *Aug*. 28. 1829.

Art. XII. *On the extraordinary Instincts peculiar to some of the Insect Tribe.* By T. H.

Sir,

Although the subject I have the pleasure to offer to your notice is not new to naturalists, still you may, I think, consider worthy of a place in the pages of your very amusing and instructive Magazine, a detail of facts which afford exemplifications to illustrate the extraordinary instincts peculiar to some of the insect tribes, and also afford an interesting subject to the practical entomologist.

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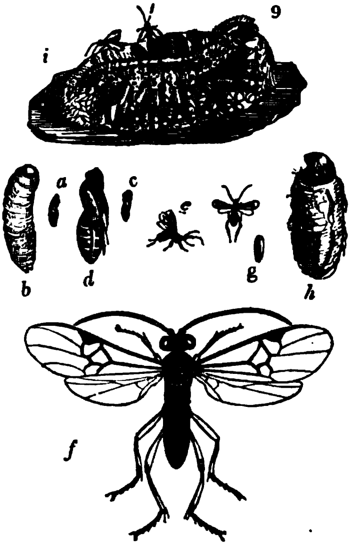
* Analecten zur Naturwissenschaft und Heilkunde, gesammelt auf einer Reise durch Italien, im Jahre 1828 (Dresden, 1829, 8vo), p. 169—179.

My present communication is to give you a brief detail of observations regarding the reproduction, or rather the propagation, of a very small species of ichneumon fly (*I*chneùmon ovulòrum of Linn., Platygáster ovulòrum of the fam. Proctotrupìdæ of Latreille).

On the 28th of last month (June) I put twenty caterpillars of the large cabbage butterfly (Pónti*a* *brássicæ*) into a wire cage: they were mostly full-sized larvæ, and continued to feed on cabbage leaves placed in the cage with them. On the following day, June 29., five or six of the largest left the leaves, and crawled about on the sides of the cage during the rest of the day. The next morning, June 30., I found them resting on large clusters of minute cocoons of an ovate form (*fig.* 9. *i*), the largest not exceeding two lines in length, and about the thickness of a caraway seed. Each was enveloped with a fine yellow silk, resembling that of the common silkworm (the pupa of *Pha*læ̀na *mòri*). On these clusters the caterpillars remained the whole day without moving. Fresh leaves were given to the rest; but in the course of this day they all left off feeding, crawled about the cage, but underwent no other change. Early the next day, July 1., I found they had, with the exception of two or three, all ejected the parasitical progeny they had been impregnated with, and, like the preceding caterpillars, continued resting on the clusters they had formed: the remaining three followed the example of the others, and the last operation of these devoted caterpillars was to envelope each cluster in a veil, formed of the most delicate web. Some of them executed the task; but the greater part were too feeble to complete it; and in the course of three days more, July 4., they became motionless, and gradually, one after another, fell, shrivelled and exhausted, to the bottom of the cage.

The clusters of cocoons varied in their numbers; some contained upwards of a hundred, others not more than sixty or seventy. I watched during the day to witness the change from the larva to the pupa state, but in vain; the operation was performed during the night, and it was only in the last two or three caterpillars, in an enfeebled state, that I observed the larvæ of the ichneumon fly emerging from the lower side of the caterpillar; but the few which came forth remained inactive during the rest of the day.

On July 12., the first-formed clusters of cocoons evinced a state of maturity, and in the course of the day numbers of the perfect insects came forth. Their exclusion was effected by forcing open a small circular lid at one end of the cocoon (*h*). The insects, as soon as they came forth, were active and ready for flight.



a, Larva of the natural size; *b*, magnified. *c*, Imago of the natural size; *d*, magnified. *e*, Perfect insect natural size; *f*, magnified. *g*, Cocoon natural size; *h*, magnified.

It is of diminutive size, the females not exceeding two lines in length, the males something less; the antennæ filiform, longer than the body, black; the legs rufous, some have the thighs of the hinder pair marked with a black spot; the head, thorax, and body, of a deep black, except in the females, which are marked with white on the anterior part of the abdomen beneath; the abdomen is ovate and subsessile; the wings are a little longer than the body, rounded at their ends, and the anterior pair marked on their exterior margin, near the posterior angle, with a black spot.

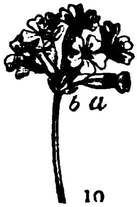
I send for your examination some of the parcels of cocoons, and many of the insects; and I hope you will indulge your readers with a magnified figure of this interesting little British insect, and of the cocoons in their collective form, as well as in magnified detail. (*fig.* 9.) I am, Sir, &c.

Clapham, July 18. 1829. T. H.

Art. XIII. *An Introductory View of the Linnean System of Plants.* By Miss Kent, Authoress of *Flòra Doméstica, Sylvan Sketches,* &c.

(*Continued from* Vol. II. p. 164.)

Before I proceed to speak of the beautiful class *Hexándria*, it may be well to say a few words of the different species of calyx. Linnæus enumerated seven; of which, by far the most common is the *perianth*, which grows immediately beneath the flower; the other six are the *spatha* (a slice, *Gr.*) *involucrum* (a wrapper, *Lat.*), *amentum* (a bond, *Gr.*), *gluma* (a husk, *Lat.*), *volva* (*volvere*, to wrap, *Lat.*), and *calyptra* (a cover, *Gr.*). The volva and calyptra belong exclusively to plants of the twenty-fourth class, of which we shall speak in its place; the glume is the calyx of the grasses. The other three have been disputed by many botanists, as not properly *calyces*. It was a rule with Linnæus, to characterise the genera of plants by the parts of fructification, and it has been said of him that he sometimes misapplied terms, and made nature bend under the yoke of system. In most cases, his love of nature, stronger than his self-love, preserved him from this error, as many passages in his works amply testify; but there appears to be some foundation for the assertion that he sometimes improperly bestowed the name of calyx on parts which he found necessary to the distinction of genera. I spoke of the *involucrum*, in my last letter, as a name given by some botanists (I should have said by Linnæus) to the leaves (now called bracteas) at the base of the umbels, in umbelliferous plants. It is not wholly confined to those plants commonly so designated, but extends to several others which have a similar mode of inflorescence, as the Prímula, &c. (*fig.* 10.) In addition to other objections to the term *calyx* as applied to these leaves, it has been observed that where they are present there is commonly a calyx also, as in the example here given, where every flower has its own calyx (*a*), as well as the *involucrum*, which is styled the common calyx (*b*).



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To give the name of *calyx* to the *amentum* is like calling a whole village a cottage. The *amentum* is the mode of inflorescence; it is composed of a number of flowers affixed to a thread-shaped receptacle termed the *rachis* (back-bone, *Gr.*), and the true calyx is a hollow scale, which protects the stamens and pistils. Why the *spatha* should be considered as inappropriately named a calyx, I cannot understand; it is the office of the calyx to protect the flower until it has strength sufficient to protect itself; some flowers never lose the protection of the calyx, others require it only while in bud. The *spatha* does enclose the bud; by the swelling of which it is opened on one side, and gives egress to the flower. In some plants, the flower is still contained within it, like a statue in its niche; as in the arum, commonly called by village children, "lords and ladies" (*fig.* 11.), or that elegant plant the Cálla æthiópica, commonly called the arum. A young student will, probably, be surprised to learn that the beautiful white, frosted, leathery vase, which he took for the corolla of that flower, is the calyx; but he must not suffer himself to be misled by colour. The colour of flowers is often materially influenced by soil and situation; some flowers have been known to

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change from blue to white, and again to resume their blue, by being transplanted, and restored to their original station; and though green is usually the colour of the calyx, it not unfrequently happens that a flower of gayer habits is seen to assume a cloak of yellow, rose-colour, or crimson; while some grave and quaker-minded plants wear a corolla scarcely distinguishable, by colour, from the leaves. Observe the calyx of many species of the ranunculus, confounded under the familiar name—buttercup, and you will find them yellow; in some, the colour is as bright a yellow as the corolla itself: the calyx and corolla of the magnificent trumpet-flower (Bignòn*ia* radìcans) are of the same colour. Fúchs*ia* coccínea has a deep purple corolla, within a calyx of bright scarlet. The willow-herb (Epilòbium), of which many species are well known, has a calyx of deep crimson. *D*áphne *M*ezèreon has a bright rose-coloured calyx, with no corolla; the buckthorn, lady's mantle, pellitory of the wall, &c., have the corolla and the calyx of the same green colour. There are some flowers in which, one of the two being deficient, botanists are themselves undecided whether the one which remains be properly the calyx, or corolla; but the best rule that can be given to a young botanist is, that, in general, the stamens are alternate with the petals or segments of the corolla, and opposite to the leaves or divisions of the calyx.

The class *Hexándria* is chiefly composed of what are termed liliaceous plants; by which are meant plants that, by their similarity of structure, are nearly connected with the lily. Some few of these are in the third class, *Triándria*; but the greater number are Hexandrous, and many of them furnished with the *spatha*. The great majority of the plants of this class are in the order Monogýnia, which contains some of the most delicate and some of the most splendid flowers that our gardens exhibit. It will be necessary to remind the young student, that he has more to consider than the *number* of the stamens, and the presence of the pistil, before he determines a flower to belong to this class. The stamens are either *all* of equal length, or each *three* are equal; if *four* of them exceed their brethren in length, he will probably find that the corolla is four-petaled, and may seek it in the fifteenth class. The liliaceous plants are six-petaled, or six-cleft; the style is triangular, and the capsule has three cells. Of the nineteen genera of this class and order, which grace the British Flora, several are remarkable for their delicate beauty; the more splendid and useful plants of this class are chiefly foreign. Who is there that is not acquainted with the little drooping pearl that blooms beneath the snow, and seems as if it had fallen with it from the clouds? Who does not hail the pretty snowdrop? The name of this flower is happily expressive of its whiteness, lightness, and pendent grace, and of the season of its birth. The botanical appellation is not quite so comprehensive, Galánthus (milk-flower) nivàlis (snowy). To the passing eye the snowdrop appears wholly white, because its three outer petals, being longer than the three inner, close over them, and conceal a stamp of green on their outer side and many fine lines of green within. We generally find that the whitest flowers are more or less tinged with a pale green, which seems rather to increase than to detract from their whiteness. We may observe this in the snowflake, or summer snowdrop, *Leucòjum* (*leukos*, white, *ion*, violet) æstivàlis (of the summer). Notwithstanding that "snow in harvest" is proverbially unwelcome, this is a general favourite, and not unfrequently confounded with the true snowdrop of spring: there are, however, obvious distinctions between them; the snowdrop is a solitary flower, the snowflake has three or four blossoms in a cluster; the latter has all its petals of equal length, and each tipped with a stamp of green, visible on both sides. The specific name is scarcely correct, for the plant blooms in the month of May. Another elegant little white flower appears in the interval between the death of the early snowdrop and the birth of the latter, in English termed the Star of Bethlehem, but botanically named, like the others, with reference to its whiteness, Ornithógalum (bird's-milk) umbellàtum (from its mode of inflorescence). The petals spread open in the form of a star, each having on the under side a keel of pale green. This plant was so common, from the earliest times, in Bethlehem, and all Palestine, that the bulbs were an article of food; apparently of the cheapest kind, since, in the 2d book of Kings, we find the high price charged for a measure of them coupled with the dear rate of an ass's head, to show the extent of a famine in Syria: they are still eaten there. In this country the plant is rare, though less so than the

"Lone flower, hemm'd in with snows, and white as they."

The *Narcíssus* [*narkē*, stupor; effect of smell; *Encycl. of Plants*], which derives its name and birth from the youth who pined with *self*-love, while he thought he loved another, is also a native of this country. Though many have fallen into the same mistake, he is the only acknowledged victim to it, of whom Fame has preserved the memory. We are told that

"Narcissus, drooping on his rill,
Keeps his odorous beauty still;"

yet the fact is, that the particular species honoured, as more peculiarly the descendant of the beautiful youth, with the title of Poetic Narcissus (*N.* poéticus), blooms in the open fields, in elevated situations and a sandy soil. The poets tell us also that Narcissus was changed into a yellow flower; yet this has white petals. The cup which it fills with tears is yellow, with a border of white divided from the yellow by a circle of deep crimson. Are we to believe that the flower, aware of the fate of its ancestor, has learned to shun the watery mirror that proved so fatal to him, and in consequence has lost its jaundiced hue? or are we to suppose that the Poetic Narcissus usurps a title more justly due to that species called

——— " Daffodils,
That come before the swallow dares,
And take the winds of March with beauty."

Certain it is, that the daffodil is furnished with a spacious lachrymatory. The reader is, doubtless, acquainted with the wild daffodils found in moist woods, or thickets, in the month of March, and will remember the large cup in the centre, which is crimped like a lady's frill: the young student may be puzzled to know what name to give to this cup. It is not the corolla; *that* is formed of six petals, affixed to the cup. Let him open the flower, and he will find that the base of the cup is, more or less, elongated into a tube; within which is collected the honied treasure that awaits the bee. This part is termed the nectary, a name given by Linnæus to the part containing the collected honey, whatever be its form; and, in variety, it vies with the corolla itself. In many flowers, the corolla performs the office of the nectary; in others it is distinct, as in that of which I am now speaking; and whenever the young student meets with any part of a flower, that he is puzzled to find a name for, he will do well to consider if it may not be the nectary. In many cases, he will be apt to overlook it altogether, unless it be pointed out to him.

The fritillary, Fritillària (*fritillus*, a chess-board), is a handsome, but rare plant, bearing a flower about the size of an egg-cup, broad at its base, and pendulous; the colour a red purple, checkered with paler purple or white; whence it has been called the chess-board flower, checkered daffodil, &c. If the student inspect this flower narrowly, he will perceive within each petal, near the base, a little black line, which he will discover to be a cavity secreting honey; and will immediately decide upon its name and office. Hence he will learn that flowers have sometimes several nectaries; this has one to every petal, and the flower has six petals. That elegant flower called the crown imperial is a foreign species of this genus. We have one British tulip; the common yellow tulip is the only species native of this country. When double, it has somewhat the appearance of a large yellow rose, and is very magnificent. The splendid tulips usually cultivated in gardens are importations from the East, deriving their name from the Turkish turban (called *tulipan*) which they are supposed to resemble. From the East, too, we have the hyacinth: one, called the starch hyacinth, is the produce of this country; its flowers smell like wet starch, and are considered very oppressive. The harebell (formerly called the English hyacinth, but latterly removed to the genus *Scílla*) contains a great quantity of starch in the juices of its roots.

Asparagus is a native plant, growing on the sea-coast; but the wild and the cultivated asparagus would scarcely be recognised as the same species, culture having increased it to six or eight times its original magnitude. The sprouting shoots of this plant, when grown in a garden, grace the most luxurious tables; but the same part of the wild plant would not be worth the gathering. Some foreign species of asparagus are armed with thorns or prickles: the Cape asparagus, Thunberg informs us, is called by the inhabitants of the country, *waht en beetje* (wait a bit), because its crooked thorns catch their clothes, and check them in passing; hence also the word asparagus itself, from a Greek word signifying to lacerate.

The lily of the valley, now so seldom met with, but always admired —

> " Shading, like detected light,
> Its little green-tipt lamps of white," —

is one of four British species of Convallària (a barbarous compound of Greek and Latin, equivalent to our English name): the others bear the name of Solomon's seal; it is said, because a transverse section of the roots exhibits characters resembling the impression of a seal. All the species are rare. Gerarde recommends the fresh root, bruised, for the cure of any "bruse, black or blue spots, gotten by fals, or women's wilfulness in stumbling upon their hasty husbands' fists."

Sweet flag (*A'*corus *Cá*lamus) is another rare plant, growing in watery places, and chiefly about the rivers in the county of Norfolk. It has been a custom from time immemorial, to strew it in the cathedral and some of the streets of Norwich, on the mayor's day, for the sake of the fragrance which it gives out when trodden upon. Of late years, being less plentiful, its place has been partly supplied by the water flag, and other plants. The roots, dried and powdered, are used by the peasants of Norfolk as a cure for the ague.

Of the rush (*Júncus*) we have three and twenty species, indigenous of Britain; among which are the common (*J.* conglomeràtus) and the soft rush (*J.* effùsus), so well known by the various domestic purposes to which they are applied. For mats and the seats of chairs they are now superseded by the bullrush (*Scírpus* lacústris); and their chief use at present is in the making of rushlights. Before the introduction of carpets and mats, they were used for strewing floors, even at court, a custom mentioned by Shakspeare and other poets. The barberry shrub has been much slandered as being an enemy to the ripening of corn, which is perhaps the reason that we so seldom see it. If the filaments of its flowers be touched on the inner side, near the base, they will immediately contract, and throw the pollen upon the stigma. Various causes have been assigned for this; Sir J. E. Smith says they contract by irritation, like the muscles of animals. The fruit is acid, and is preserved in the form of jelly, pickle, or comfits.

Among the exotic plants of this order are many flowers of exquisite beauty, of which a great portion belong to the family of lilies, styled by Linnæus the nobles of the vegetable kingdom. We are not to suppose that every flower familiarly called a lily, is of the genus *Lílium*, though that genus contains many very handsome and very dissimilar flowers; the purple martagon (*L. Mártagon*), the scarlet martagon (*L.* chalcedónicum), the bulb-bearing lily (*L.* bulbíferum), and the magnificent white lily, are all of this genus, and all worthy of admiration. The scarlet martagon is interesting from the circumstance of its being believed by many persons to be the true hyacinth of the ancients; the bulb-bearing lily is remarkable for the little black bulbs which it bears in the axils of its leaves; these bulbs, though but little larger than a pea, increase in size, when planted, until they are large enough to produce new plants. The white lily is too well known, too highly and deservedly admired, to need either eulogy or description; but I cannot refrain from noticing the extreme fineness of the extremity of the slender filament which supports the large anther attached to it by the back; so slender is the juncture, that we can scarcely believe but that some magnetic attraction lurks within.

This, like the tulip, and many other liliaceous flowers, is without a calyx; the corolla is sufficiently stout to protect the beauty that lodges within it; but being itself unguarded, the pure whiteness of its delicate petals is often injured by rain or other enemies, like a beauty, who, placed in a rank of life which subjects her to the necessity of facing the elements, loses the dazzling fairness of her complexion, while her health and strength remain unimpaired. Among the finest lilies not included in this genus are the African lily (Agapánthus, delightful flower, umbellàtus, from its mode of inflorescence) and the whole genus Amarýllis (one of Virgil's nymphs), more especially the *Atamásco*, *Belladónna*, Jacobæ`a, and Guernsey lilies. To describe, or even to enumerate, all the fine flowers of this order would be a work of time, and would demand more space than can be afforded here. I will only observe in passing, that the Tuberose, Gloriòsa, and Chandelier, are of the number: the first of these is well known; the name of the second speaks for itself; and, indeed, so we may say of the last, which is named from the position and brilliancy of its fine scarlet flowers, which shed their cheering light over the wastes of Africa. The African genus, Cyanélla (blue, *Gr.*), is remarkable for the form and position of its stamens, which resemble the human thumb and fingers. The asphodel partakes the lot of angels, in flourishing both in Tartarus and Eden. According to old traditions, the dead are nourished with its seeds, — a circumstance which accounts for its being placed in such different climates.

Though we have several British species of *A*llium*, the genus is best known among us by foreign species, cultivated in this country for domestic use; as the leek (*A.* *P*órrum), shallot (*A.* ascalónicum), onion (*A.* *C*èpa), garlick (*A.* satìvum), &c. Among the more useful plants we may reckon the aloe, of which several of the species are of incalculable importance to their countrymen; one in particular, a native of Mexico: its trunk and leaves supply the place of beams and tiles for the roofs of houses; furnish needles, thread, paper, cordage, shoes, stockings, and other articles of clothing; and the juice affords wine, honey, sugar, and vinegar. The American aloe (Agàve, admirable), also, serves many useful purposes, exclusive of its reputed power of keeping off apparitions and evil spirits, for which it is so highly respected by the Egyptians. In speaking of useful plants, I must not omit to mention, that not only the rattan (Cálamus, *kalam*, Arab.; vèrus, true), and other canes; but the bamboo also (*Bambùsa*, the Indian name; *a*rundinàcea, *arundo*, a reed, from *aru*, a Celtic word signifying water) is included in this order. Among the many important uses of the latter plant, is one which I wish I could speak of as more general. The Chinese merchants, when they go out to sea, provide themselves with four bamboos, which being placed crosswise, so as to leave a square space in the middle, are slipped over the head, and made fast to the waist with a cord; and by this simple apparatus they insure their safety in case of wreck.

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* This word, derived from the Celtic, is expressive of th pungent, biting flavour of the plants.

We will conclude our sketch of this valuable order with two genera of peculiar interest. That which many consider as the finest-flavoured of all known fruits, the beautiful, fragrant, and delicious pine-apple, is one of a large genus, Bromèl*ia* (from Bromel, a Swedish botanist), of which some of the species yield a pure water, more grateful, perhaps, under certain circumstances, than the pine-apple (Bromèl*ia Anànas*) itself. Of the Córypha (from a Greek word signifying the summit, in reference to its frondescence) there is but one species, the fan-palm (C. umbraculífera), an East Indian tree, with a tall straight stem, bearing at the top ten or a dozen leaves, upwards of 18 ft. in length, and 12 in breadth. One leaf will shelter twenty persons: when dry, they fold like a fan; and it is not unusual for persons who are travelling, to carry one division of a leaf by way of parasol. Cottages are roofed, and tents made with them. They supply the place of writing paper; and, in times of scarcity, the pith within the trunk of the tree is made into bread.

The second order of this class is at once rich and poor; poor in number, but rich in quality: it contains but one genus of very considerable importance, but that one is a host in itself. I speak of rice (Orỳza satìva), an Ethiopian plant, upon the seed of which many of the inhabitants of the East almost entirely subsist. Its growth is very similar to that of the grasses, differing only in the number of stamens. In cultivation, like most dry plants, it requires a large portion of water; it is threshed, beaten, or scalded, to clean it from the husk, before it is brought into this country. It has been observed that, in a scarcity of corn, rice may be in part substituted for it in the making of bread; but the scarcity must be very great, to make that an economical expedient in this country, where the rice sells so high. It is said to have been successfully cultivated in Scotland; and could it be naturalised to this country, so as to be raised in the fenny lands, which cannot be made to produce corn, it might, perhaps, be cheap enough to become a real blessing to the labouring classes, for it is undoubtedly very nutritious; but, at present, it is rather an article of luxury than of economy for them. In the East, a strong intoxicating spirit is obtained from this grain, there called *paddy;* whence the name of paddy-bird given to a beautiful little Javanese bird that feeds upon it.

England produces but one plant of the second order, and that formerly belonged to (and by some botanists is still ranged in) the genus *R*ùmex, of the third order. This genus contains the docks and sorrels; but the mountain sorrel being deficient in the number of pistils, and in some other respects differing with the other species, has been placed apart, by the name of Oxýria renifórmis. We have ten British species of *R*ùmex, of which the common and the sheep sorrel will be likely to puzzle the young botanist, if he be not aware that they deviate from the rest of the genus, in having their stamens and pistils on separate plants. This circumstance would probably rank them in another class, but that they so entirely agree with the rest of the genus in other respects, that it is thought better to keep them together, and warn the young student of the variation, than to part plants which Nature has so closely allied. These irregularities will sometimes occur, and the young botanist will find them noted under each class and order to which they belong. The whole genus *R*ùmex may appear strange at first sight, on account of a tubercle (*fig.* 12. *a*) (in some species pretty large) which destroys the outline of the flower. Some of these tubercles appear like little rubies, and add much to the beauty of the flowers. A curious peculiarity in this genus is a joint near the base of each flower-stalk. If a person attempt to pluck one flower from the cluster (in any of the species), he will find a small part left on the common stalk; if he continue this round an entire whorl, it will become more conspicuous, every flower leaving the part of the stalk below the joint (*b*). The common sorrel (*R.* Acetòsa) is much used in Lapland for curdling milk, which the natives of that country seem to seek every possible mode of doing. The few other British plants of this order are rare; the best known is the common meadow-saffron (*C*ólchicum autumnàle), remarkable for the slow ripening and deep lodging of its seeds. The flower breaks forth in the autumn, in appearance very similar to the crocus, from which it differs chiefly in the number of the stamens and pistils. Its tube is remarkably long, proceeding directly from the bulb, in which the germs are embedded, and remain under the earth during the winter. In March or April the fruit ripens and shoots forth from the ground, upon a fruit stalk, the leaves appearing at the same time. The flowers, like several others which are not accompanied by leaves, are

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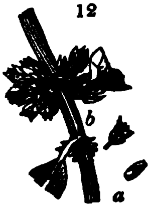
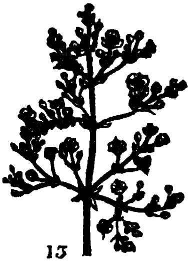


frequently called "naked ladies." This small order produces nothing of extraordinary importance. The fourth order, Hexagýnia, is little better than nominal; the fifth order, Polygýnia, contains the water-plantain (*A*lísma, from *alis*, water, *Celt.*), of which several species are natives of this country; one, *A. P*lantàgo (*fig.* 13.), is very common, and might borrow from the heart's ease the familiar appellation of *Herb Trinity*. The calyx has three leaves, the corolla three petals; the capsules, of which there are six, are ranged in a triangular form: the flower-stalk is three feet high, and the upper part clothed with flowers, set in whorls infinitely compounded, six in each whorl, three twice the size and length of the alternate three. Where this plant is luxuriant, the subdivisions of the whorls are innumerable. Wherever a pond is to be found, the water-plantain is to be found by the sides of it. It blossoms in the month of July, and is seen to most advantage at about two or three o'clock in the afternoon; after that time its thin and somewhat crumpled petals begin to droop.



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(*To be continued.*) 134 ·

ART. XIV. *Introduction to Geology.*

(*Continued from* Vol. I. p. 453.)

GEOLOGICAL SYSTEMS OF ARRANGEMENT.

It has been seen in our introductory article on the progress of geology, that the researches of geologists, commencing with Werner, Saussure, Mitchell, and Smith, led to the discovery of certain laws relative to the origin and succession of rocks. Various terms have been employed in their classification. It was long considered sufficient to divide them into two great classes: the *Primary*, consisting of rocks whose structure is chemical only, and possess no traces of organic beings; and the *Secondary*, consisting of rocks whose structure is chiefly mechanical, and which contain numerous substances of obvious vegetable and animal origin. This arrangement was recommended by its simplicity, and the facility it affords of referring the different rocks to one or more of these great divisions.

In order to distinguish the more recent portions of the class before named Secondary, a further division was suggested, and the term *Tertiary* has been adopted by most geologists, as designating the strata which were deposited successively over the chalk. The utility of this distinction has become more apparent since the discoveries which the last few years have produced; and the arrangement is further authorised by the peculiar character of those numerous tribes which people these beds, and which were called into existence subsequently to the chalk.

It was afterwards perceived that the Secondary class required division in that part of the series which approached nearest to the Primary, or earliest-formed rocks; because there appeared an intermediate class, which, notwithstanding they contained organic remains, possessed a structure that allied them to the Primitive. On these the name of *Transition*, or Intermediate, was conferred.

There were thus founded four principal divisions of rocks, Primary, Transition, Secondary, and Tertiary. M.'Al. de Humboldt adheres to this order in his Table of Geological Formations, which enriches the work of Baron Cuvier; and most Continental and English geologists pursue the same system.

Werner, the celebrated mineralogist of Germany, divided the formations into *Primary* and *Floetz* only, which latter includes the Transition and Secondary. Mr. Weaver and Dr. Macculloch have adopted a similar arrangement in their classification of rocks.

Mr. Coneybeare, in his admirable *Introduction to the Geology of England and Wales*, makes use of another system, founded on the position of the strata and rocks, under five heads: 1. Superior order; 2. Supermedial order; 3. Medial order; 4. Sub-medial order; 5. Inferior order. This arrangement has the single recommendation of being divested of all theory.

The first is the Tertiary class above mentioned, or that which Werner named the *Newest Floetz* class; the second is the Secondary class, the *Floetz* of Werner, and the *Sedimentary* of others; the third and fourth comprise the Transition, or intermediate class; and the fifth the Primitive, or Primary Rocks.

From its apparent want of perspicuity, this mode of classification will not, probably, be so often used as the four divisions before adopted. Notwithstanding it is allowed that no such distinctions as primary, secondary, and tertiary absolutely exist in nature, and that there is no imperative necessity for applying such terms, it is maintained that the system is extremely convenient and intelligible, and that it ought to be continued; at all events, that we are justified in using it until some one can contrive a better.

Without entering into a disquisition on the comparative merits of these systems, it appears most convenient, in the present instance, to adhere to terms long used and well understood; and, in so doing, we hope to avoid perpetuating that confusion which the frequent changes of nomenclature and classification in physical science necessarily produce. We propose, therefore, in our brief sketch, as far as is consistent with the present state of geological knowledge, to conform to an arrangement hitherto generally adopted. Our enumeration of the principal classes will naturally proceed according to the order of creation or deposition. Hereafter, when we come to detail the formations, we shall probably find it advantageous to reverse that order; and, commencing with the highest in geological position, descend to the lowest of the series.

ORDER OF CREATION.

Primary.

Primary, or *Primitive*, *Rocks*, as their name imports, were the first in the series of creation, the lowest in the order of position. They are conceived to have originated prior to the formation of any thing endued with life, because no traces of any organic substances, animal or vegetable, have ever been discovered in them.

Their structure is crystalline, and, "in constituent principles, they appear to have remained exactly in the same situation as when they first acquired solidity." They occupy, probably, not more than a sixth part of the absolute surface of our continents, but appear to form the foundation upon which all the other rocks repose. They consist chiefly of granite, gneiss, and mica slate, with horneblende, serpentine, sienite, &c., and numerous modifications of each. They contain the metallic ores, and primary limestone or statuary marble, and supply the hardest materials for roads, and the most imperishable of all stones for buildings, bridges, and other works requiring great strength and durability.

In England the primitive rocks are comparatively of insignificant elevation, and are mostly covered with slate and other rocks of later formation.

In other parts of the world they attain to vast elevations, and their height is further increased by volcanic products. Gigantic masses, like the volcanoes of Teneriffe, of the Azores, of Orozaba, and Caraccas, "insulated in the vast extent of the seas, or placed on the coasts of continents, serve as mighty sea-marks for the pilot, when he is unable to determine the position of his vessel by observation of the stars." The Peak of Teneriffe, for instance, "furnishes a direction to the mariner in a circuit of more than 260 leagues, and the eye takes in, in calm weather, from the summit of the Piton, a surface of the globe of 5700 square leagues, equal to one fourth of the surface of Spain."

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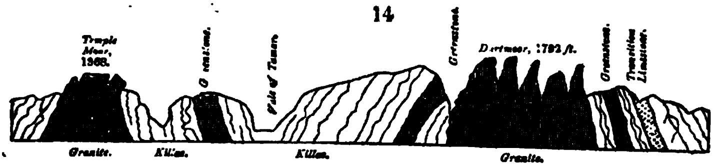

Our section (*fig.* 14.), on the authority of Messrs. Coneybeare and Phillips, represents part of the primary district of Cornwall.

Pyrogeneous Formations.

Basaltic Rocks, Trap, and *Porphyritic Rocks*, of supposed igneous origin, and of various degrees of antiquity, are associated alike with the transition and primary, and often materially influence the position of the most recent deposits. They are unconformable and unstratified, appearing sometimes in the form of outlying masses, sometimes as dykes, traversing and intersecting numerous rocks, and occasionally forming beds or masses, which alternate with other formations. They often cap the summits of the primitive mountains; and, on the Andes, vast masses of porphyry and basalt are described by Humboldt as "arranged in the form of regular and immense columns, which strike the eye of the traveller, like the ruins of enormous castles lifted into the air."

No organic remains have been decidedly found in these rocks. Basaltic dikes impede the progress of the miner, disturb the position of the coal measures, alter the nature and structure of the adjacent rocks, and penetrate sometimes into higher formations, even through the chalk. Columnar basalt has long excited the wonder even of those for whom natural science has few charms. The magnificent specimens in the north of Ireland and in the Western Islands of Scotland are of this class.

The beds of toadstone and whinstone of Derbyshire, and the whinsill of Northumberland, are evidently rocks of the basaltic series.

Under this head the accumulations of volcanic matter, of all ages, seem to be properly referable.

Transition.

Transition, or *Intermediate*, is that order of rocks which approximates, both in geological position and in mineralogical character, to the primary. They all bear traces of organic remains; some sparingly, others, particularly the limestones, very abundantly. Some of them are of mechanical origin, or are composed of fragments which previously existed in a different state. They are more widely extended than the primitive rocks, and are "the repositories of the most useful treasures of the mineral kingdom." They are stratified; their beds are commonly highly inclined, dipping in all directions, and abounding in singular contortions.

Geologists differ as to the number of rocks which, with propriety, belong to this section. It is agreed to admit roofing slate, slate clay, or shale, transition limestone, and greywacke. Mr. Bakewell adds the old red sandstone, as belonging to the greywacke series: he also includes the mountain limestone, as an upper portion of the transition limestone. The first two are included in Mr. Coneybeare's carboniferous order.

Nearly the whole of Wales is composed of this series, and, in Caernarvonshire, it attains an elevation of more than 3500 ft.

Secondary.

The *Secondary Rocks* comprise a very numerous order, abounding in extraneous fossils. These remains are, strictly speaking, lapidified, and are generally penetrated with the stony matter of their matrix; often, however, in a finer form, so as to admit a crystalline arrangement of its particles. This observation is derived from Mr. Coneybeare, in drawing a distinction between the tertiary or superior order, where, in England at least, this change has not been so effected. Rocks of this order "supply mankind with those important necessaries of life, coal, iron, lead, rock-salt, &c.; besides the less valuable articles, marble, freestone, lime, gypsum, plumbago." Secondary rocks are distinctly stratified.

On the Continent these formations attain a much greater elevation than in Britain. They occupy the summits of the Pyrenees, and form the upper part of the northern chain of the Alps, where they rise to the height of 7000 or 8000 feet. In the present imperfect state of our acquaintance with the geology of the globe, it is not practicable to ascertain the exact comparative areas occupied by the great divisions of rocks, but it is computed that the secondary and tertiary beds cover two thirds of the land.

In consequence of some peculiar characters in the lower members of this order, and for the purpose of more convenient classification, most geologists have subdivided the series.

The *Lower Series* comprises the coal measures, millstone, grit, and shale, the mountain limestone, and the old red sandstone. These formations are often highly inclined, and abound in contortions, curvatures, and faults, denoting the influence of some disturbing force which was not extended into the upper series. The products of the lower section are by far the most valuable in the entire system of rocks.

There appears considerable difficulty in admitting the separation of the transition and secondary orders at the point assigned by some writers; that is, between the mountain limestone and the coal measures. The former conforms so completely to the disposition of the beds of the latter, that it really seems impossible to view them but as parts of one great class. Neither is the argument founded on the "truly remarkable difference in the nature of the organic remains," in the coal and limestone formations, wholly free from objection; because the genus Prodúcta is common to the mountain limestone, the shale, and the argillaceous iron ore between the coal seams, in frequent cases, particularly in the great South Wales basin.

The parallelism, inclination, and curvature of the beds of old red sandstone, are so conformable, also, to those of most coal fields, that it seems equally difficult to separate them there. (See figs. 107. 114. and 117. Vol. I.) On the other hand, it is urged that the mountain limestone is allied to, if not identical with, the acknowledged transition limestone, and that the "old red sandstone possesses all the mineral characters of greywacke except the colour;" and Mr. Coneybeare admits that, in many instances, "the limits between this series and that of transition rocks, can only be arbitrarily assigned;" and further, that "at least ten characters will be found in common between them, for one which would lead to an opposite arrangement."

So many circumstances, geographical as well as geological, concur to associate these formations, that it appears desirable so to treat them; and it then remains to be determined whether such associated formations should be transferred to the transition class, or remain the lowest section of the secondary. In the unsettled state of the controversy, we incline to the latter; and conceive that we should more effectually extricate ourselves from theory, by adopting the alternative offered in Mr. Coneybeare's arrangement, under the characteristic appellation of the *carboniferous* order.

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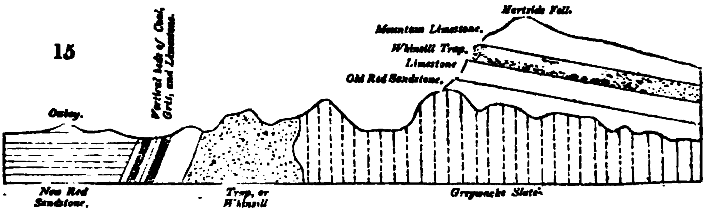

The preceding sketch (*fig.* 15.) from Dr. Buckland, from Section B. of the formations near Appleby, exhibits this series partly resting upon vertical beds of greywacke.

The *Upper Series* consists of all the formations between the coal and the chalk, as will be hereafter detailed. These rocks seldom incline considerably in this country, like the preceding class. The directions, or lines of bearing, of the English strata stretch in an irregularly parallel direction across the island, from the south-west to the north-east. As these beds rise to the north-west, their uplifted edges are often abrupt, forming escarpments. The oolite limestone and the chalk furnish the boldest examples of these outcrops, while the clays and soft strata form intermediate valleys and low plains. See the section (*fig.* 16.) of the principal secondary formations in the midland counties.

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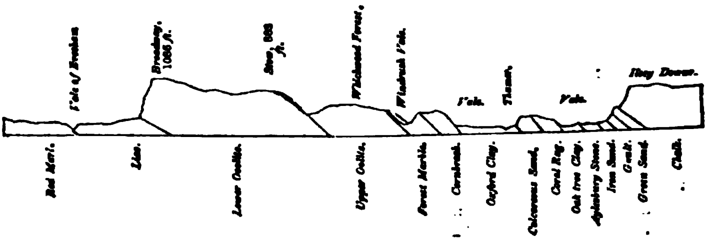

Tertiary.

Tertiary Class. — After the consolidation of the chalk, it is apparent that its surface was subjected to the violent operations of mighty waters, which occasioned the partial removal or destruction of that formation; and there are indications of a long interval of time between the deposition of the chalk and the succeeding strata. Their organic remains are very different, and the other characters of this series are also dissimilar. All these circumstances, announcing an important geological epoch, are sufficiently remarkable to suggest an arrangement of the beds above the chalk, under the separate class of *Tertiary Formations.*

It is well observed by Professor Sedgewick, that " the English formations which rest immediately upon the chalk belong to a distinct epoch in the natural history of the earth; for they are not coextensive with, nor always conformable to, the beds by which they are supported, but rather resemble materials which have been mechanically drifted into the deep depressions or water-worn denudations of the older rocks. They are, therefore, generally limited to the extent of certain preexisting inequalities in the surface of the globe.

" Deposits originating in the way we have described must necessarily be of variable thickness, and liable to every possible modification from the action of mere local causes. Any useful classification of their component beds would, perhaps, never have been effected, had not the organic remains, preserved in them, exhibited an extraordinary uniformity of character and arrangement. An accurate examination of these spoils has, therefore, supplied us with the means of establishing analogies between phenomena which otherwise must have appeared entirely unconnected."

These deposits seldom appear consolidated in the form of rocks, but generally consist of varieties of clay, marl, and sand, with occasional concretionary masses. In this section also occur two or three alternations of fresh-water or lacustrine beds; that is, of deposits, which, from the numerous shells they contain, resembling the Testàcea of lakes and rivers, are judged to have originated in fresh water. In Bavaria they are stated to contain perfect beds of coal and iron-stone. In France this class seems to have been carried somewhat higher than in the English series. The latter comprises the plastic clay and its accompanying sands, the London clay, the upper marine or mixed formation of the Isle of Wight interposed between the fresh-water strata, the shelly crag of Suffolk and Norfolk; and, above all these, particularly in the south-east and eastern counties, appears a vast irregular accumulation of debris, or water-worn and transported fragments of all the preceding formations, known by the name of diluvium.

Dr. Buckland noticed the remarkable occurrence of insulated portions of tertiary strata on the summits of the Savoy Alps, at elevations of more than 10,000 ft. above the level of the sea; and the observations of geologists have now fully determined the fact, that tertiary formations exist in every quarter of the globe, and differ in few essential respects from those in this country.

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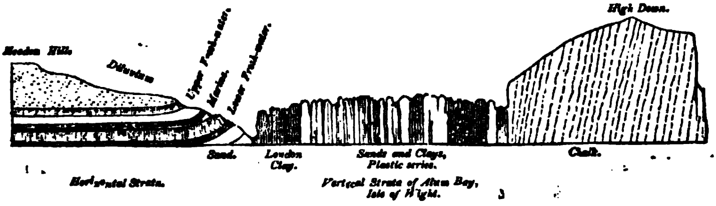


We have selected an illustrative section of the western extremity of the Isle of Wight (*fig.* 17.), where the entire series of tertiary strata are developed under the most interesting circumstances. The present is not the time or place for adverting more particularly to the extraordinary local disturbance by which so many of the superior formations have acquired a vertical position.

General Observations on the Strata which contain Organic Remains.

The word *Formation* is understood to apply to certain groups of strata which have been associated together for the sake of ready and simple classification, and of avoiding the perplexity otherwise arising from their numerous subordinate beds. But for this comprehensive arrangement, it would be difficult to distinguish, with sufficient precision, the separate members of the secondary strata. As each formation is, in general, made up of several members, so also the latter are composed of an infinite number of beds; and those beds, again, of innumerable finer lamina: but the whole series being found to possess some common character, some obvious relations, or some general similarity in organic accompaniments or circumstances of position, they are appropriately classed under one common denomination.

In this country these names are chiefly derived from some predominant quality or structure; as the green or chloritic sand, ferruginous sands, red sandstone, magnesian or dolomitic limestone, gault, clunch, and oolites. To some of these descriptive titles others have been superadded, which are derived from certain localities where these formations are best developed; such as the Folkstone marl, Weald clay, Oxford clay, Hastings sands, Woburn sands, and Shanklin sands. Others are wholly derived from localities; as the London clay, Kimmeridge clay, Portland limestone, Petworth marble, Forest marble, &c.

As the formations comprehend many inferior beds, it must often occur that they contain some whose mineralogical characters differ materially from those imported by their names. For this reason a nomenclature derived from characters not universal must be considered defective. Of this class is what is termed the plastic clay formation, which chiefly consists of sand. The Weald clay contains thick beds of sand, with limestone and fresh-water marbles. We may add also the clays and limestones of the ferruginous sands, the Kelloways rock, the Oxford clay, &c.

The practical geologist is often led to perceive frequent transitions and modifications in the structure of the same beds; the clays often changing to indurated argillaceous rocks, shales, and schists, or to beds of sand; while the sandstones, losing their cohesion, become siliceous clays, or friable sands; the sands pass into chert, and the gravel into breccia, or conglomerates. Of this changeful property the red marl, or red sandstone formation, is an instance. The lias, the cornbrash, and the ferruginous sands, afford numerous examples of a similar tendency.

It must not be inferred that these deposits, to which we shall hereafter more specifically advert, present an absolute uniformity of character in every part of the world, or even that they can be at all times satisfactorily identified at remote points. Modifications of those characters by which they are best distinguished within the limited area of our island, enormous expansions in some cases, the introduction or the absence of certain beds or members in others, increase the difficulty of the investigation. At such times the observer has recourse to the organic remains, as a frequent means of removing his doubts when most other circumstances are equivocal.

Such is the diversity observable in the composition and external features of the secondary formations, that the study of this division is infinitely more attractive, and in its results more singular than that of the primary order, and its mineral products. "The knowledge of these substances, which is the *ultimate* object of the mere mineralogist, is to the geologist only a subordinate acquisition, and forms but the alphabet by which he endeavours to decipher the chapter of nature which he studies. Hence the rarer varieties which, in the estimation of the mineralogist, possess the highest interest, will, in the eyes of the geologist, attract the least regard."

There is little doubt that the advances which have been made in the developement of the secondary strata have been mainly owing to the high interest which their extraneous fossils have excited. A powerful stimulus has also been derived from the writings of the celebrated French naturalist, Baron Cuvier, whose discoveries have thrown a charm over this branch of science, and strewed the path of all succeeding geologists with flowers. "This study is rendered interesting," he observes, "by the variety of productions of partial or general revolutions which it affords, and by the abundance of the different species which alternately offer themselves to view; it neither has that dull monotony which attaches to the study of the primitive formations, nor does it force us, like the latter, almost necessarily into hypotheses. The facts with which it is conversant are so prominent, so curious, and so obvious, that they may suffice to occupy the most ardent imagination; and the conclusions which they afford from time to time, even to the most cautious observer, have nothing vague or arbitrary in their nature. Finally, by the careful investigation of these events, which approach, as it were, to the history of our own race, we may hope to be able to discover some traces of more ancient events and their causes; if, after so many abortive attempts already made on the same subject, we may yet flatter ourselves with that hope."

From the commencement of his investigation, the observer is struck with the numerous proofs of the altered state of our globe, and with the extensive distribution of the fossil remains. Not in one particular spot, not in one region, not in one quarter of the globe alone: but wherever the strata have been explored; in the greatest subterranean depths, in the bowels of mountains, in situations far remote from the sea, and on heights vastly above its level, these wonderful relics are deposited. In almost every part of the world, the same phenomena are exhibited, constituting durable monuments to mark the revolutions upon our planet. As the enquiry proceeds, it is perceived that the species of fossil animals, and even many genera, differ totally from the animals that now inhabit the earth. In the order of fossil Testàcea, appertaining to the English formations, more than 1300 species have been named and described by Messrs. Sowerby and other naturalists; but it is probable that at least nine tenths differ materially from the recent species. On the Continent, M. Lamarck has produced a list, and specified the distinguishing characters of about 720 species of fossil shells. Messrs. Cuvier and Brongniart enumerate more than 600 species of marine shells in the calcaire grossier of the environs of Paris, by far the greater number of which are unknown in a recent state.

By means of the fossils in this order of rocks, we are furnished with unanswerable evidence of the antiquity of our globe, and we can form some vague notions of the vast series of years which must have elapsed during the formation of such a multitude of deposits, and even of the subordinate parts of any one formation; for instance, those of the London clay, or calcaire grossier. These were evidently deposited slowly, and in a tranquil sea, since the fossils are found in regular beds, and in perfect preservation. It also appears that, after some species were deposited, they wholly disappeared, and gave place to others. All these facts indicate a long series of generations of marine animals.

Now, in comparing these phenomena with what takes place in our seas, it does not appear that any similar depositions, to any material amount, are proceeding.

"Solid beds," observe Messrs. Cuvier and Brongniart, "are no longer formed, in any magnitude, in our present seas, and the species of shells are always the same in the same parts of the sea. For example, since they fished for oysters upon the coast of Cancale, for pearls in the Gulf of Persia, &c., it is not seen that these shells have disappeared, to be replaced by other species. From researches, made by one of us, it appears that, during near 2000 years, the bottom of those seas has not been changed; that it has not been covered with any new bed; and that the species of shells, which were fished then, live and are fished even at the present day."

It has been stated, that one of the most useful discoveries resulting from the investigation of the secondary strata is that universally prevailing rule, that similar strata contain similar extraneous fossils. However curious these remains might be before considered, as memorials of extinct tribes and of mighty changes, they became more valuable to the geologist when he had ascertained that certain organic remains were peculiar to certain formations, and that these bodies furnished him with data by which to trace and to determine the identity of such formations in remote parts of the world. Experience has fully proved that these characteristics are infinitely more to be relied on than any with which we are acquainted. Chemical or mineralogical distinctions are far from universal: they are often modified, and sometimes wholly changed, even in limited areas; their practical application for geological tests has been repeatedly found delusive. Not so the extraneous fossils: the same genera of vegetables and Testàcea, for instance, which characterise the carboniferous limestones and shales of the English coal fields, may be observed in similar formations at Spitzbergen, in numerous parts of the European continent, in North America and Van Dieman's Land. The Trilobite of our transition limestone occurs in France, in North America, and other remote localities; and the fossils of the transition slate of Wales are repeated in Germany, in France, Colombia, New York, Pennsylvania, and near Lake Oneida.

All the observations of scientific travellers tend to confirm this important law. By its aid we are enabled to construct geological maps with perfect precision. Those which have been compiled by Messrs. Smith, Greenough, Farey, Buckland, Webster, Weaver, and other geologists of well-known reputation, owe their accuracy mainly to the observance of this principle. Geological surveys have now been made nearly over the whole of our island. District surveys have frequently delineated the superficial boundaries of the formations, with as much precision as the direction of our roads and rivers. Some of the geological county maps and sections of Mr. Wm. Smith, published since his great map, are particularly elaborate, and are locally useful in unravelling the intricacies of the more complicated districts. All these of which we have spoken have appeared within the last sixteen years, and attest the rapid progress of this department of art in our own country. In Ireland, it is understood, geological surveys are proceeding simultaneously with the trigonometrical admeasurement of that country, conducted under the direction of the Board of Ordnance.

An attentive consideration of the circumstances displayed in the secondary deposits seems to lead us to the natural inference that the earth has been subjected to more frequent revolutions, since the creation of organic beings than previously to that era. We are chiefly conducted to this conclusion by the immense variety of strata, by the peculiarities of their position, and by the remarkable fact of the extinction of certain genera and species of animals, the succession of new races in more recent beds, and the alternation of strata containing marine, terrestrial, and fresh-water or lacustrine productions, all indicating a vast series of geological epochs. To this fact various other concurrent phenomena bear testimony. Among them may be included the oft-recurring instances both of partial and general disruption, in this division of rocks. Sometimes a single formation, or a series of formations, appear to have been subjected to the disturbing force, of which the incumbent strata exhibit no traces. This is remarkably exhibited in the Isle of Wight, where the horizontal beds of Headon Hill abut upon the vertical strata, and demonstrate that the convulsion which placed the latter in that position, took place before the formation of the superior beds. (See *fig.* 17.)

For further instances, we refer the reader to our First Volume, figures 107. 109. and 114., which were introduced in illustration of unconformable strata. The lias and new red sandstone formations furnish abundant examples of horizontal beds reposing upon highly inclined strata, all indicating that, at the time those strata were so displaced, the higher formations had not been deposited. Sometimes the strata appear to have sunk down; others have been lifted to considerable elevations, and fragments have lodged on the summits of distant mountains. We have seen elsewhere, in the instance of the Weald of Kent, that enormous excavations have been made, that some of the superior formations have been wholly removed from that area, and the interior beds denuded. (figs. 127. to 130.) We have also seen (figs. 108, 109. 117.) that certain isolated portions form outliers, capping the summits of hills, and remain solitary remnants of strata once continuous, and interesting memorials of past revolutions.

Among other proofs of the recurrence of such revolutions, in an earlier state of the globe, may be classed those breccious rocks and conglomerates which are composed of the fragments that originally occupied, or yet partially occupy, remote situations. The effects of a destructive power, as exhibited in the abruption of escarpments and the excavation of defiles, are also manifested by the reproduction of new rocks from the debris; and it has been further remarked, that these conglomerate rocks bear marks of a similar destructive agency, occurring at some period subsequent to their consolidation.

The tertiary formations also exhibit proofs of similar catastrophes, in the alternation of marine and fresh-water strata, and in the mingled accumulations of animal and vegetable remains derived both from the sea and the land. "Life, therefore," observes M. Cuvier, "has been often disturbed on this earth by terrible events: calamities which, at their commencement, have, perhaps, moved and overturned, to a great depth, the entire outer crust of the globe; but which, since these first commotions, have uniformly acted at a less depth, and less generally. Numberless living beings have been the victims of these catastrophes; some have been destroyed by sudden inundations, others have been laid dry in consequence of the bottom of the seas being instantaneously elevated. Their races even have become extinct, and have left no memorial of them, except some small fragments which the naturalist can scarcely recognise. Such are the conclusions which necessarily result from the objects that we meet with at every step of our enquiry, and which we can always verify from examples drawn from almost every country. Every part of the globe bears the impress of these great and terrible events so distinctly, that they must be visible to all who are qualified to read their history in the remains which they have left behind."

Diluvium.

Over a large portion of the surface of our island, particularly towards the south and east, is spread a covering composed of the fragments of rocks, clay, sandstones, and chalk; which debris, or broken portions, were evidently brought thither, and were irregularly accumulated, by means of prodigious currents which swept over the face of the earth. These appearances are confirmatory of the Mosaic account of the deluge, and by such an agency alone can these phenomena be adequately accounted for. The catastrophe appears to have destroyed many races of animals, particularly the larger carnivorous quadrupeds, that then inhabited the land, and even some inhabitants of the waters, if we judge from the extinct species which we trace in this debacle.

It has been stated, that there appears ample evidence of the frequent occurrence of similar catastrophes, the consequence of inundations more or less extensive. That to which we now refer was, therefore, the last of these revolutions, and modified the form of the land as we now view it. Geologists are agreed in designating the mass of transported materials, resulting from that event, by the term *diluvial.*

Few deposits are so interesting to the naturalist. It contains not only the remains of those organic beings which then peopled the earth, and acquaints us with the zoology of that remote period, but it comprises portions derived from many older formations, and, on tracing these fragments to their original sites, enables us even to perceive the direction of this diluvial current.

Remains of mammiferous animals have been discovered in most of the great diluvial valleys in England; nor are they confined to these low sites, but have often been found embedded in the gravel of our hills.

How far all deposits of this character may be affirmed to be absolutely contemporaneous must remain unsettled for a time. It can only be decided ultimately by the physical evidence that can be brought to bear upon the question. In the present state of our knowledge, there seems no reason to reject the distinction originally made by Dr. Buckland, between the detritus formed by the Mosaic deluge, and those deposits which accumulate from causes now in action. With respect to the thickness of diluvial matter, its greatest accumulation is probably on the coast of Norfolk where it is more than 250 ft. in thickness. Our sections (figs. 123. and 124.) represent portions of the cliffs of that county. Mr. De la Beche observed in Jamaica, that the diluvial gravel was from 200 to 300 ft. thick. In some parts of Switzerland, it is stated to be more than 600 ft. in depth.

An investigation of these deposits will contribute much to our knowledge of the force and direction of diluvial currents. Mr. Farey long ago remarked, that no true theory of the earth or system of geology will ever be produced, which does not embrace a knowledge of diluvial ground equally or more intimate than that of "all the primitive and transition countries in the world; because, diluvium being vastly more spread indicates later operations on our planet, and is more within the reach of our investigations than the formation of mountains."

Alluvium.

Alluvium is understood to designate those accumulations of earth, gravel, sand, and other loose materials which result from causes in daily operation. These materials are derived partly from diluvium, partly from the decomposition of rocks by the action of the elements, the wearing away of strata by torrents, the deposition of decayed vegetable matter, peat, and ooze; from shifting sand-banks at sea, and blown sand on shore, and even from the operations of man. Of this class are the deltas which are produced by sedimentary subsidence; and of the same character is that formed at the mouth of the Mississippi, on the most gigantic scale that our globe exhibits, from the forests of timber which have floated, during the lapse of ages, down that mighty stream. In short, it defines all deposits formed since the deluge, as distinguished from those accumulated through diluvial agency.

Except under certain circumstances, such as the formation of low tracts of land at the mouths of great rivers, and on flat shores, the effects of alluvial operations upon the earth, as compared with the diluvial, are inconsiderable, and have produced slight alteration from the remotest period.

Some of these depositions contain traces of the work of man, such as rude implements, canoes, &c., and skeletons of some animals, which, in the lapse of ages, as population and cultivation extended, gradually disappeared, and are now strangers to the soil of which they formerly were the principal occupants. At the same time, these animals, for the most part, belonged to a different class from those which are traced in the diluvial deposits, and the subterranean caverns. The first class, in almost all cases, is strictly identical with existing species, under similar climates, and includes the human race. The other animals either approach in resemblance to those which exist only in tropical climates, or are entirely unknown in a recent state, and are wholly unmixed with traces of man and his operations. The essential difference in these two deposits, therefore, is this:—that whilst alluvium is of comparatively modern origin, whilst it contains the remains of existing beings, among which the fossils of more ancient times are sometimes fortuitously introduced, the genuine undisturbed diluvium contains no such admixture, but the latter only. Hence the relative ages of these accumulations of detritus are fully and clearly ascertainable. In a recent controversy, conducted in the *Edinburgh Philosophical Journal*, Dr. Fleming has opposed this hypothesis of Baron Cuvier and Dr. Buckland, and refers the extinction of these early quadrupeds, not to a deluge, but "to the destructive influence of the chase."

Professor Sedgewick's papers in the *Annals of Philosophy*, on the alluvium and diluvium of the great fen district, contain some valuable practical information on this part of the series; so, also, do the articles by Mr. Warburton and Mr. Lyell, on the recent fresh-water limestone in Scotland, and shell-marl in England, in the *Transactions of the Geological Society;* and Dr. Buckland's paper on the alluvial products in the basins of London and Hampshire. The influence of the wind in accumulating sand, has been treated on in some articles in the *Philosophical Magazine* for 1827. On the margins of our coasts, this process is not without its uses, and long ranges of sand-hills, elevated by this means, protect the country from the encroachments of the sea. Occasionally, however, it threatens to encroach upon the land. Mr. Hawkins mentions, in vol. iii. of the *Transactions of the Geological Society of Cornwall*, that many thousand acres have been covered with sea-sand on the northern coast of Cornwall. "The particles of this sand have been wafted thither by the north-westerly winds, which blow with such force on that side of the county; and this deluge of sand is said to be progressively extending. The medium of its transportation is supposed to be the salt spray, which, in stormy weather, is known to be wafted to a great distance. The sand consists chiefly of very finely comminuted shells, which, when once deposited by these natural air-balloons on the higher grounds, are continually drifted to leeward."

We have thus taken a rapid survey of the principal divisions into which the rocks, strata, and deposits, from the earliest to the latest, are usually arranged. They comprehend by far the greatest part of all that are known on the globe. On looking at the small space which our island occupies, and comparing the enormous expansion of these formations on our continents, we cannot but regard it as a circumstance of singular geological interest, that England should thus present, within so limited an area, such an epitome of the globe. In some points, the whole series of the strata, from the chalk to the coal formation, may be crossed within the space of twenty miles; and the distance from the chalk hills of Dorsetshire, and the granitic range of Dartmoor, is scarcely fifty miles. Certainly, few countries in the world offer so many facilities for studying the science of geology as our own.

PART II.

REVIEWS.

ART. I. *Catalogue of Works on Natural History, lately published, with some Notice of those considered the most interesting to British Naturalists.*

BRITAIN.

Transactions of the Plinian Society. Session 1828–9. Edin. 8vo, pp. 40.

We have already (Vol. I. p. 291.) given some account of the origin and intention of this Society; and having from time to time been favoured with papers read before it, we have only to express our satisfaction at the evidence of prosperity afforded by the present publication. None of the papers read before the Society are printed at length in their *Transactions;* but abstracts are always given, in the very judicious and useful manner adopted by the Geological Society of London.

Rhind, William, Member of the Royal Medical and Royal Physical Societies of Edinburgh: Studies in Natural History; exhibiting a Popular View of the most striking and interesting Objects of the Material World. Illustrated by ten engravings. Edinburgh. Small 8vo. 6*s.*

This work is got up, no doubt, with the best intentions; it might perhaps have passed for something thirty years ago, but it is far from coming up to the taste and science of the present day. Fourteen sections treat of nature generally, reproductive powers, geology, the atmosphere, rain, &c., an autumn day, vegetables, birds, the ocean, insects, bees and ants, winter, man, and the city and country. The first section commences with the following sentence. " If we could suppose a human being in the full possession of all his faculties, and in the maturity of his judgment, led to an eminence, and for the first time made to behold the earth and the sky, the waving trees, sparkling waters, green meadows, and the happy sporting of birds and animals, what would be his expressions of wonder, delight, and admiration!" Would it be too much to say that this is most unscientific? What would be the value or the extent of the man's wonder or admiration, who saw for the first time things with the nature of which he was unacquainted? It is only by a knowledge of nature intimately and in detail, that we can admire rationally; the " expressions of wonder," of ignorance, afford but a momentary gratification, because they cannot reach further than the senses. In the concluding section, on the City and the Country, it is said, " Compare the mild, peaceful, rosy-faced rustic, sitting by his door after the summer day's labour is over, fondling his little ones on his knee, to the pallid, fierce-looking, and turbulent frequenter of the city gin-shop, or the ragged and demoralised inhabitants of the close and crowded alley." It is too late in the day for this sort of sentimentalism; the comparison would not be fair, unless it were made between persons of equal education and equal command of the necessaries of life, in which case, we can assert from observation, that the inhabitant of the " close and crowded alley," who spends a part of two or three evenings a week with his equals or friends, reading the newspapers and talking over the news of the day, in the "city gin-shop," or ale-house, will be as superior a being to the "peaceful, rosy-faced rustic, with his little ones on his knee," as a gentleman of fashion will be to a fox-hunting country squire who never comes to town and who belongs to no club.

At page 180., mention is made, on the authority of Mr. Bell, of an insect called leather-coat-jack, which will bear heavy carriage wheels to drive over it without sustaining injury. We should like to have some particulars of this insect; we suspect the author is confounding a story told by Mr. Bell in his *Anatomy of Expression*, respecting a human being of extraordinary muscular powers, with some other story which he has heard respecting insects. We are sorry to seem to be severe on the production of a writer who evidently means well; but it is because we wish to put him in the way of doing better.

The British Naturalist. London. 12mo.

This is a clever, eloquent, and in several respects an original work. We have sent it to a reviewer who will do it justice in an early Number.

The Library of Entertaining Knowledge, published under the Superintendence of the Society for the Diffusion of Useful Knowledge. London. 12mo. Parts, 2*s*. each.

We have formerly (Vol. II. p. 188.) spoken favourably of the commencement of this work, and have now before us five additional parts completing the third volume. Vol. i. part ii. is the continuation of the menageries, equally deserving of commendation with part i. Vol. ii. part i. treats of vegetable substances used in the arts and in domestic economy, commencing with timber trees. This, as it could not well otherwise be, is a compilation chiefly from Miller's *Dictionary*; it is on the whole tolerably accurate, though not without a few errors and omissions. For instance, at p. 111., the True Service is said to be a native of the south of Europe, generally cultivated here as a shrub; and at the same time we are told that the people of Kamtschatka use the fruit as food, and that in some parts of the north a spirit is distilled from it. This error proceeds from confounding the Mountain Ash with the True Service. Vol. ii. part ii. treats of fruits. The author, or rather the compiler, obviously knows little about the subject practically, otherwise he would never have admitted such a passage as the following: — "To the facility of multiplying varieties by grafting is to be ascribed the amazing extension of the sorts of apple, probably from one common stock. The varieties at present known are considerably more than a thousand." From the last sentence we gather, that by extension of the sorts the compiler means increase of sorts, which has nothing whatever to do with grafting, but is effected by raising from seed. Next comes the following very inaccurate sentence: — "Of late years these varieties have been increased in a remarkable manner, by the application of the pollen of one sort to the blossom of another." Vol. iii. part i. is on the Pursuit of Knowledge under Difficulties; and part vi., marked, by mistake we suppose, vol. iii. part i., is on Insect Architecture. The last two parts are decidedly the best; that on insect architecture is singularly interesting and entertaining, and will unquestionably have a powerful influence in spreading a taste for this kind of reading, and for actual observation. It is attributed to our correspondent Mr. Rennie, who has enriched it with many original observations marked with his initials. When part ii. appears we shall review it at length, and further remarks on "Fruits" and "Timber trees" will be found in No. xxiv. *Gard. Mag.*

The Young Lady's Book: a Manual of elegant Recreations, Exercises, and Pursuits. London. 12mo.

We notice this work because it contains some well-written and beautifully illustrated introductions to mineralogy, conchology, entomology, botany, and ornithology. From such introductions in such a book, we anticipate a powerful stimulus to the study of natural history among that sex and class for whom such studies are in a particular manner adapted. It is not in our line to notice the other parts of the work, farther than to state that they appear equally well executed, and that the engravings are most exquisite, both in design and in execution. If we were to find any fault, it would be with the fanciful initial letters to the chapters, which are not at all so clear and obvious as they ought to be. The silk binding and lace paper are beyond our praise. Every mother who has young daughters, and can spare a guinea, will not be sorry for having exchanged it for a copy of *The Young Lady's Book.*

The Gardens and Menagerie of the Zoological Society delineated; being Descriptions and Figures in Illustration of the Natural History of the living Animals in the Society's Collection. In Monthly Parts, 2*s.* 6*d.* each. Nos. I. to III. have appeared.

" At the request of the Council of the Zoological Society, the secretary, N. A. Vigors, Esq., has in the kindest manner consented to charge himself with the task of superintending the execution of every department of the work. The descriptions and anecdotes in illustration of the natural history of the animals represented will be furnished by E. T. Bennett, Esq., the vice-secretary. The whole of the drawings will be made by Mr. William Harvey, who has already given so many proofs of his talent in this department of his art; and the engravers, Messrs. Branston and Wright, will exert their utmost skill to do justice to the efforts of his pencil. The number of animals figured in each will vary in some degree with the interest of the subjects, and the extent of the letter-press required for their illustration; the average however will be about *twelve*. In addition to these cuts, most of the articles will be followed by appropriate vignettes, which will in many instances be devoted to the scenery of the gardens; but will more frequently be drawn from the taste and imagination of the artist."

From the above extract our readers will infer that this work is of the highest authority, and we can assure them that the engravings have never been surpassed in beauty; if they have ever been equalled, it is in the *Tower Menagerie* (Vol. II. p. 50.), and in the *The Young Lady's Book.* The compositions presented as vignettes are exquisite in their kind, and even the letter-press is very superior.

Art. II. *Literary Notices.*

On the 21st of January will be published, dedicated, by permission, to the Honourable Court of Directors of the East India Company, the first number, in folio, with ten coloured plates, of *Illustrations of Indian Zoology,* consisting of coloured figures of Indian animals, unknown or not yet published; from the collection of Major-General Hardwicke, F.R.S. and L.S. M.R.A.S. M.R.I.A. &c., selected and arranged by S. E. Gray, Esq. F.G.S. F.R.S.L.

A Life of our great Naturalist Ray is in preparation, by Mr. G. W. Johnson, of Great Totham, Essex.

Vol. vi. of Curtis's *British Entomology* will be ready in the course of the month.

PART III.

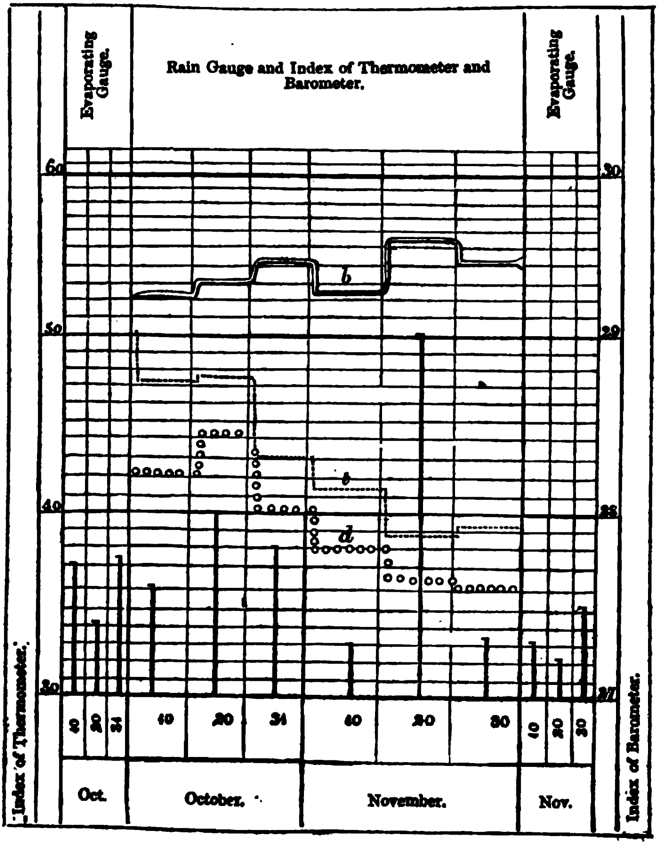
MISCELLANEOUS INTELLIGENCE.

Art. I. *Calendar of Nature.*

Scotland.

Diagram, showing the Motion of the Mercury in the Barometer and Thermometer, and the Dew Point, or the Mean of each, for every Ten Days in October and November; also the Depth of Rain in the Pluviometer, and the Quantity of Moisture evaporated in the Evaporating Gauge, for the same Period; as extracted from the Register kept at Annat Gardens, Perthshire, N. lat. 56° 23½′, above the level of the sea 172 ft., and 15 miles from the coast, being the mean of daily observations at 10 o'clock morning and 10 o'clock evening.

18



To avoid repetition in describing the lines on the preceding diagram, we must refer to Vol. II. p. 478. The mean temperature in October this year was 46°; and in November, 39·8°. In turning back to p. 94. Vol. II., it will be observed that the temperature in October last year was 4·5°, and in November 4·3°, higher than in the corresponding month this season. The depth of rain in October this year amounted to 2·25 in., and in November to 2·5 in., being nearly half an inch less than fell during the same period last season; and this difference of temperature has been accompanied with corresponding effects on the progress of vegetation. The last day of October was the coldest: mean temperature of that day 39°; extreme cold 35°; wind N. The warmest day in that month was the 11th: mean temperature of that day 54·5°; extreme heat 59°; wind W. The coldest day in November was the 18th: mean temperature of that day 33·5°; extreme cold 28°; wind N. The warmest day in that month was on the 3d: mean temperature of that day 48·5°; extreme heat 52°: wind W. The mercury in the barometer was highest on the 28th of October, being 29·85 in.; and lowest on the 21st, being 28·72 in. In November the mercury in the barometer was highest on the 19th: height 29·78 in.; and lowest on the 4th, being 28·70 in. The wind is invariably in the east or north-east when the mercurial column rises highest; and frequently in the west and south-west when it is most depressed. In October there were only 3 days of brilliant, and 12 days of partial, sunshine; 16 days were cloudy. Rain fell on 9 days, and 22 days were fair. In November there were 9 days of brilliant sunshine, and 3 partial sunshine; 18 were cloudy; and on 10 of these days rain fell. There were loud gales of wind on the 5th, 6th, 8th, 10th, 11th, and 14th of October; and brisk gales on the 13th and 25th of November.

The rains in the early months of autumn produced a continued evaporation, which cooled the earth's surface to that degree, that it prevented wheat from giving a braird in the same time, under the same temperature in the air, as last year. On the 7th of October the Grampian Hills were covered with a slight fleece of snow, and a few flocks of wild geese were seen arriving from the northern coasts to the Low Carse. Wheat that was sown on the 1st appeared above ground on the 18th: mean temperature of that period 47·3°. It will be seen at Vol. II. p. 96., that wheat gave a braird in 13 days in October last year, under a mean temperature of 52°. Flocks of fieldfares appeared in the Carse of Gowrie on the 26th. The flowers of the *A*'rbutus *U*'nedo began to open on the 12th, and the plants were in full blow by the 28th. The harvest last season "was secured on the highest grounds, which form the north bank of the Carse of Gowrie, by the 22d of September." (Vol. II. p. 96.) It was the 6th day of October this year that the fields were clear on the same grounds, 15 days later.

At the beginning of November, forest trees exhibited the "sear and yellow leaf," but few had parted from the tree. The frequent loud winds to which they had been exposed throughout the autumn months, had partly strengthened that part which attaches the leaf to the shoot; and the low temperature retarded the ripening of the young wood: about a third part fell on the forenoon of the 9th, after a severe hoar frost on the morning of that day; on the 18th and 19th, a keen frost completed the work of denudation on beech, birch, ash, maple, &c.; but young oaks, and many varieties of apple and plum trees on standards, still retain about a fourth part of their foliage, an unfavourable symptom for the crop of fruit or acorns next year. On the 18th georginas, Indian shot, love-apples, &c., were destroyed by a temperature of 28°. The Chinese primrose withstood the early shock in the open border, and also the early red Indian chrysanthemum, both of which are now in flower in the open air. Below or at 40° mean temperature, vegetation makes very slow and imperceptible progress. Wheat which was sown this year on the 24th of October, only gave a braird on the 22d of November, a period of 29 days; mean temperature of that period 41·2°: and wheat that was sown on the 29th of October, on the same day, and on a contiguous field, as reported from last year, where a braird was obtained in 19 days, under a temperature of 44° (Vol. II. p. 97.), has not yet appeared above ground, although 11 days more have elapsed; the mean temperature of the period being 39·8°. Such is the variable climate of Scotland, and such are the effects of four degrees of diminished temperature on vegetation, when it approaches that point at which vegetation stands still. — *A. G. Nov.* 30.

ART. II. *Retrospective Criticism.*

THE Journal of a Naturalist has already been reviewed in the pages of your Magazine; it would be superfluous, therefore, to submit it to a fresh analysis. As the first impression, however, seems to have met with an unusually ready and rapid sale, I may be allowed, perhaps, briefly to notice the second edition, which the public has had the good taste thus early to call for. It is no wonder the work has found so favourable a reception, for a more pleasing little volume, relating to what may be termed *the popular study of natural history*, has seldom issued from the press. It is calculated to afford pleasure to the most experienced observer, by presenting to his mind, in an agreeable form, objects with which, perhaps, he may be already familiar, and to lure the inexperienced to the like pursuits, and enlist them among the lovers of nature. If our author wants the merit of originality justly due to Gilbert White, his volume, nevertheless, is not unworthy of occupying a permanent place on the same shelf with that of the historian of Selborne. There is withal such an admirable tone of good feeling pervading every page of the book, from beginning to end, that it was not without surprise, not without something like indignation, that I read the severe and unmerited censure passed upon the writer by the reviewer, Vol. II. p. 181. of your Magazine. There are some critics, however, who seem to think that they do not well fulfil the functions of their office, unless they inflict a certain degree of chastisement on every unlucky author who comes under their clutches. Accordingly, the reviewer falls foul of our author, who, if he be not an errant hypocrite, must be an amiable and kind-hearted man, and accuses him — of what? why, of "*utter insensibility to the misery he describes*," viz. of the poor; and, moreover, attributes this want of feeling to "*a habit of enjoying his own ease, without thinking of others; and of looking upon the poor (perhaps unconsciously to himself) as an inferior race of beings.*" On referring to the original passage of the *Journal*, I confess, I really can see nothing in it to call forth such severity: and the author himself too (who, in all probability, must have seen this piece of criticism), we may conclude, is of the same opinion; for he has had the hardihood to reprint the passage, word for word, in his second edition. (p. 15, 16.) I rejoice that he has done so, as it affords a fair presumption that, on mature consideration, he is not conscious that the charge is just. The case appears to be this: he is giving us a plain statement of the employment and occupations of the poor in his district; and after mentioning the demand for labour arising from the limekilns, the cultivation of the potato, the teasel, and the harvest in general, he concludes with the breaking of the limestone for the roads. "Then comes our employment for this dark season of the year (winter), the breaking of the limestone for the use of the roads, of which we afford a large supply to less favoured districts. This material is not to be sought for in distant places, or of difficult attainment, but to be found almost at the very doors of the cottages, &c., and there is a constant demand for the article." At this work, he tells us, "a man, his wife, and two tolerably sized children, can obtain from 2*s.* 8*d.* to 3*s.* per day, the greater part of the winter." Now it appears to me that he is here describing the employment and earnings of the poor at the *worst of times*, and under the *least favourable circumstances*; and if his account be correct (and we have no reason to doubt it), it is clear the poor in this district, though not, of course, exempt from many of the ordinary and unavoidable evils of poverty, are yet better off, having more regular employment and a greater certainty of the means of subsistence, than the poor in many other parts of the kingdom. From the general picture presented to us, they appear to be healthy, contented, and comfortable in their stations. "Our labourers," he says, "their children, and cottages, I think, present a testimony of their well doing, by the orderly, decent conduct of the former, and the comforts of the latter." Who can wonder that this amiable man should express some satisfaction at such a state of things? The accusation of the reviewer strikes me as so utterly uncalled for and unwarrantable, that I cannot resist the inclination I feel to raise my humble voice in protestation against it. Judging of the author from a perusal of his book only, every one, I should suppose, must think well of him as a naturalist and as a man. Beyond this, I, for my part, have no knowledge of him whatever, nor am I certain even of his name; having heard the work attributed to more than one person, with all of whom I am totally unacquainted. I have, therefore, no private or interested motive for standing forth in his defence, but give my testimony simply from honest conviction of the truth, quite unbiassed and unprejudiced.

Besides visiting the author with unjust censure, and accusing him of insensibility to the misery of the poor, the reviewer indulges in a strain of pert flippancy, which I cannot help thinking evinces, to say the least of it, a very bad taste. Take, for example, the very first sentence of the critique: "You have, no doubt, met with a *grass-green* volume, of very *sufficing plumpness*, and *flourishing appearance*, lately produced under the title of *The Journal of a Naturalist.*" The "grass-green" cover of cloth or canvass must be allowed to be, in point both of neatness and durability, a vast improvement on the ordinary binding in *boards*, as it is called. Of what exact dimensions the reviewer would have had the book, we are not informed; in its present state, however, it is in bulk and stature a very well proportioned volume. And as to its *flourishing appearance*, no author's name is displayed in the titlepage with a long train of F. L. R. A. G. H. S. &c. &c., in order, as it were, to stamp the work with an "Imprimatur," and give it currency: there is no pompous, fawning dedication to some noble patron, to puff it into notice, screen its imperfections, and crave for it that support which it does not in reality deserve; but orphan-like, and unprotected even by the sanction of a name, the book is sent into the world to make its own way, to stand or fall by its own merits; and it would be difficult to conceive a more modest, unpretending performance. I would strongly recommend this reviewer to peruse an excellent little pamphlet, written in a high strain of irony, entitled, *Advice to a young Reviewer;* the tract was published at Oxford in 1807, and is attributed (I believe justly) to Dr. Copleston, the present Bishop of Llandaff. I will promise him, if not some improvement in his art, at least some entertainment, from the perusal, and, I think, both.

But it is time to quit the reviewer, and turn to the second edition of the work itself. Instead of the bad aquatinta print of the Shellard's Lane Oak, fronting the titlepage of the first edition, we are presented, in the second, with a neat little wood-engraving of the tree, by that excellent xylographer, Mr. Williams. This is a great improvement. The vignette, however, is not in Mr. Williams's best style; and the reason is plain; it is evidently copied, and copied too servilely, from the larger print, which always struck me as the worst thing in the book, wanting, as it does entirely, the characteristic features of the species, and of which the most that can be said is, that it is, perhaps, almost as much like an *oak* tree as any other, and almost as much like *any other* as an oak. The tree itself appears to be worthy of the pencil of Mr. Strutt; and had *he* fortunately been employed to make the sketch, and Mr. Williams afterwards to engrave the block from it, the cut would have borne somewhat more of a family likeness to those exquisite specimens, the joint production of these two artists, which adorn some of the early Numbers of your Magazine, and are so justly and universally admired. I have no wish, however, to find fault with subordinate parts, where there is so much reason to be satisfied with the whole. The substitution of the wooden vignette in the room of the aquatinta engraving is an exchange greatly for the better, like that effected of old, χρύσεα χαλκείων — gold in lieu of brass. There is also one additional plate in the same style as those in the first edition, representing a new or little known species of agaric, and likewise four or five other wood-engravings. Among the latter, that which shows the singular diversity of forms in the small scales (commonly called meal or dust) which cover the wings of lepidopterous insects, opens to us a wide field of interesting enquiry. How infinite is the variety which Nature displays even in her smallest works, and where, to the eye of a common observer, the objects seem uniform and alike! And how much closer an inspection will they bear, than the fairest works of art! And here I would just throw out a hint for the use of the practical entomologist, and suggest, whether the examination of these minute parts under a high power of the microscope, might not possibly, in some intricate cases, be of service towards distinguishing species from mere varieties. Where but slight discriminating marks appear obvious between two insects, if it should turn out, on microscopic inspection, that the scales of the two taken from corresponding portions of the wings, are of dissimilar forms in each, the stoutest advocate for the non-multiplication of species could hardly resist such evidence of the two insects being really distinct.

Besides the additional plates, there is, in the second edition, a considerable portion of fresh matter in the letter-press. Of the value of such new matter, the reader may judge by the following interesting extract, which is the only one I will make, having already extended my remarks to a much greater length than I at first anticipated.

"Rural sounds," observes the author, "the voices, the language of the wild creatures, as heard by the naturalist, belong to, and are in concord with, the country only. Our sight, our smell, may, perhaps, be deceived for an interval by conservatories, horticultural arts, and bowers of sweets; but our hearing can in no way be beguiled by any semblance of what is heard in the grove or the field. The hum, the murmur, the medley of the mead, is peculiarly its own, admits of no imitation; and the voices of our birds convey particular intimation, and distinctly notify the various periods of the year, with an accuracy as certain as they are detailed in our calendars. The season of spring is always announced as approaching by the notes of the rookery, by the jangle or wooing accents of the dark frequenters of its trees; and that time having passed away, these contentions and cadences are no longer heard. The cuckoo then comes, and informs us that spring has arrived; that he has journeyed to us, borne by gentle gales in sunny days; that fragrant flowers are in the copse and the mead, and all things telling of gratulation and of joy: the children mark this well-known sound, spring out, and cuckoo! cuckoo! as they gambol down the lane; the very ploughboy bids him welcome in the early morn. It is hardly spring without the cuckoo's song; and having told his tale, he has voice for no more — is silent or away. Then comes the dark, swift-winged marten*, glancing through the air, that seems afraid to visit our uncertain clime; he comes, though late, and hurries through his business here, eager again to depart; all day long in agitation and precipitate flight. The bland zephyrs of the spring have no charms with them; but basking and careering in the sultry gleams of June and July, they associate in throngs, and, screaming, dash round the steeple or the ruined tower, to serenade their nesting mates; and glare and heat are in their train. When the fervour of summer ceases, this bird of the sun will depart. The evening robin, from the summit of some leafless bough, or projecting point, tells us that autumn is come, and brings matured fruits, chilly airs, and sober hours; and he, the lonely minstrel now that sings, is understood by all. These four birds thus indicate a separate season, have no interference with the intelligence of the other, nor could they be transposed without the loss of all the meaning they convey, which no contrivance of art could supply; and by long association they have become identified with the period, and in peculiar accordance with the time." (p. 266.)

This passage is both just and beautiful, and in unison with the rest of the pages. The author, indeed, in treating of the most ordinary occurrences of nature, paints the scene with that descriptive faithfulness, feeling, and vivacity, which never fail to rouse our recollections, and set the objects before us in a manner that is at once striking and delightful. We almost fancy that we hear the melody of the birds, and behold the beauty and splendour of the plants and insects.

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* The swift, *Hirúndo A'pus.* The unobservant reader may perhaps be misled by this passage, to suppose that the swift does not *arrive* in our climate till the month of June; whereas it is well known that the bird makes its appearance in May, and sometimes by the end of April. The author, however, very justly represents the season of June and July as being particularly marked by its joyous scream.

In conclusion, I would strongly recommend this pleasing volume to every lover of nature, and particularly to all young persons, whose taste for searching into the wonders of creation and the works of their Creator, may possibly be in a great degree *formed* by the early perusal of such books. I also sincerely congratulate the public and the author on the speedy demand for a second edition; — the author, on the success of his well-executed performance — the public, on their due estimation of it, which affords a demonstrative proof that the taste for natural history is on the increase. No one, I will venture to say, who possesses the former edition, will regret having become a purchaser of the new one. — *A Friend to fair Criticism.*

The Vignette for the Titlepage. — Sir, In offering some remarks (*not* of a complimentary kind) on the new engraved titlepage for the First and Second Volumes of your Magazine, which, in the last Number, you have had the liberality to present to your purchasers without making (as the manner of some is *) any additional charge for such articles, I fear I may be performing a rather ungracious office, and transgressing the spirit of that excellent old proverb, which tells us that "we ought not to look a gift horse in the mouth." It is one feature, however, of your Magazine, that you not only allow "contributors to criticise one another," but to criticise yourself too; and, as on former occasions (see Vol. I. p. 96. and 303.) you took in such good part the criticisms of your correspondents on the ornamental vignette on the cover, I make bold to say a word or two on the one now presented to us in the new titlepage. My remarks are not made in a bad spirit; so far from it, that I beg to assure you, if I derived less pleasure from the perusal of your Numbers than I do, or felt no interest in the success of your undertaking, I should not think it worth while to say a single word on the subject. In the first place, then, the head of the lion is almost unintelligible; until the *third* examination of the print I could not, for the life of me, make out the physiognomy of the noble beast. What I now suppose to represent the animal's ear, at first view looks like his eye, and his eye like his nose; and in this manner, I find, others, besides myself, have construed his features. Thus much for the lion's *head*, against which my chief objection lies; but I am not quite satisfied with his *tail*, which, though plainly enough the lion's property, is yet so injudiciously arranged relatively to the giraffe, that, at *the first glimpse*, it strikes the eye of the beholder as belonging to the latter animal, flourishing his posterior appendage in a frolicsome mood. Nearly the same remark applies also, and applies still more strongly, to the tail of the serpent. By the way, I know not what right you have to set the lion and the serpent together so by the ears; but, for this, perhaps, you have sufficient authority, and may know better than myself. But to proceed (for I have not yet done finding fault); the fish in the foreground is very imperfectly portrayed, and the head of the vulture is almost as unintelligible as that of the lion. In the lower corner of the print on the left, immediately under the vulture's tail, there is something like a fir tree, which is very awkwardly introduced, and not well represented; and near it are two pair of small, round, white objects, of which I cannot guess the meaning. And lastly, though not least in importance, the portrait of Linnæus is wholly unlike the man, save and except his tie wig. Much stress, perhaps, ought not to be laid on a mere fancy composition, like the one in question; at the same time, its general correctness and excellence of execution are not altogether unimportant. The titlepage is to the volume something like what the vestibule is to the building; and it is, at least, ill-judged to raise an unfavourable impression *in limine*. I admire your Magazine, Mr. Editor, but not so the engraved titlepage, which, I must say, strikes me as unworthy of the book to which it is prefixed. The artist has not, neither the designer [Mr. Harvey] nor engraver [Mr. Branston], affixed his name, and has acted wisely by the omission, as the cut does him no credit; indeed, I infinitely prefer the vignette on the cover. I have again to apologise for the freedom of my remarks, and the more so as the subject of them is a *free and voluntary gift* on your part, and one on which your purchasers had, of course, no right to calculate. But where things are good in the main, we are apt to wish them to be free from blemishes in the subordinate parts: and you must be aware that reproof is most profitably administered, that is, with the best chance of success, not to those who have the most faults to correct, but to those who are most disposed to correct them.

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* The dirty practice of making the purchasers of works which appear in periodical numbers pay extra, and dearly too, for the mere ordinary titlepage and index to each volume, is become too common with some, otherwise respectable, editors. On this subject I may, perhaps, take some future opportunity to make a few observations.

Should you think well, Mr. Editor, to print these remarks, as you have done similar ones on a former occasion, the sooner you take the opportunity of doing so, the better; retrospective criticism being a dish that should be eaten *hot*, or it loses half its flavour. Yours, &c. — *B. Coventry, Nov.* 20.

The same objections having been made by "An Original Subscriber," and others, we shall try what can be done for a title to Vol. III. — *Cond.*

The Water Shrew (Vol. II. p. 399.), I am inclined to think, is not so rare an animal in this country as has been supposed; I occasionally see it on the small brooks in this parish, rapidly swimming along the surface of the water, and, when alarmed, diving with great agility. — *W. T. Bree. Allesley Rectory, Sept.* 8. 1829.

Dr. Ure's Geology. — Sir, I trouble you with a few remarks upon a letter in your last Number, containing strictures on Dr. Ure's *Geology*, perceiving you set apart in your miscellany a chapter for communications of the nature alluded to. I certainly am much surprised at the decided tone which the author assumes throughout, and the mode in which he lays down the law concerning right and wrong; having anticipated rather the contrary from the professions he repeatedly makes in the outset.

It surely becomes one, who is "not even a tyro in geology," rather to ask a question concerning any point he may not perfectly agree with, than peremptorily to pronounce that "all this is palpably wrong." To take Mr. H.'s arguments in order; I may remark, in the first place, that, in my opinion, he has been a little hasty in calling the mistake in the Table of Equivalents "an important error." An unprejudiced reader cannot, surely, view it in any other light than as a mere printer's mistake, one which may at any time occur in a work of any extent; and the utmost that can be said of it is, that it is rather a gross oversight in the correction of the press. For, although Dr. Ure may not be a geologist, practically speaking, every one will give him credit for knowing the place of the lias in the geological series. Neither can I conceive this error likely to be at all injurious to the science, even with the youngest student; for in the table immediately preceding the one mentioned by H., that bed is in its proper place, and all the doubt which such a contradiction could cause the reader might at once be removed by turning to the chapter specially appropriated to the subject. Secondly, with regard to the account of the fossils of the iron-sand, I must again differ as to the importance of the error therein supposed; nay, I will say, I think there is no error at all. Dr. Ure undoubtedly has not given us all the information he might have done, concerning those fossils, at least, he has not put it in the proper place; in this respect his arrangement is much inferior to Mr. Bakewell's; but, when he tells us that the formation has been but imperfectly explored, and quotes, verbatim, the passage in Coneybeare and Phillips, I would, on my part, respectfully submit that he is not only not "palpably wrong," but actually right. Mr. H. is very likely a Kent or Sussex man, and, not being "even a tyro in geology," perchance thinks that the few square miles of Tilgate Forest compose the formation called "the Hastings' sand." He, I say, is perhaps not aware of its extent in Beds, Cambridge, and other midland counties, and can it be there said to be perfectly explored, or even at all adequately examined: to this time, indeed, taking the formation generally, it may, I think, strictly be said, that the fossils "are not numerous;" Mr. Mantell has, indeed, shown us what we may expect on further examination, but, alas! observers like him are not every where to be met with; if we had many such, content to pass their leisure hours in thoroughly investigating the country immediately around them, room would not be left for compilers of books on geology to be even suspected of errors of this nature.

Of the few lines next in order in H.'s letter, being merely hints, I shall say nothing, and pass on at once to the consideration of the "shameful incorrectness" of the plates. It must be confessed that H. is particularly unhappy in his first example; he states that Scaphìtes æquàlis is "*peculiar to the lower chalk;*" for such an assertion one would suppose he had some authority which he could state; what it is, however, I am quite at a loss to discover, unless he happens to possess Coneybeare and Phillips's book, and understands the passage concerning Scaphìtes (p. 73.) to refer to the strata in general, instead of merely the two beds of the chalk; as every one else, I believe, would. I thus give him credit for having some authority for his assertions however distorted; though I can hardly suppose him to possess Coneybeare's book, or he would have seen that Scaphìtes æquàlis is there absolutely mentioned as a *lias* fossil. The next instance in H.'s letter is equally unfortunate, *Mỳa* intermèdia is mentioned by Mr. Coneybeare as a fossil of the *inferior oolite*, and in this case I cannot even guess at H.'s authority for calling it "*of the London clay*," as if therein only to be found. Turrílites costàta, moreover, is a green-sand fossil, and therefore rightly placed in a plate which I always considered as intended to contain, not merely the fossils of the oolite limestone beds, but to join on to the one succeeding it; that, as *it* contains fossils from the crag to the chalk, so *this* includes the beds from the chalk-marl to the cornbrash. The same will also apply to Hamìtes gibbòsus, and Vermiculària umbonàta. Of Protellària macróptera I cannot speak, not knowing the name, but I suppose Rostellària macróptera is the shell alluded to; however, of it and Turritélla conöídea nothing positive can be brought forward: to say the most, it is very doubtful whether Dr. Ure has committed any mistake in assigning them their present situations. With regard to H.'s concluding remarks, I must again confess myself unable to conceive the ill effects that mistakes like these, supposing them to be such, can have on the science; they would, at most, create a little confusion to the reader, which might be cleared away by referring to the work on the subject next at hand; and I must say, I think it would have been more becoming in Mr. H. to have done so before he parted with his letter. In general, indeed, I think we should be careful how we magnify molehills into mountains, and, for a few inaccuracies and marks of inattention, throw discredit on a book which, like Dr. Ure's, contains so many pages of sound induction and philosophic reasoning; and although most people will be inclined to differ, more or less, from his theory, or the arguments adduced in its support, yet, as geologists still seem inclined to adhere to one of the three hypotheses mentioned by Mr. Coneybeare in his *Introduction*, a book written in support of one of them by such a man as Ure may not be without its use; perhaps, indeed, we might all be much benefited, and our ideas enlarged, if men qualified for such speculation were to illustrate the other two, in connection with a good practical account of the present state of the science. I fear, Sir, I have already encroached on the space allotted for others, and will therefore conclude by subscribing myself, Yours, &c. — *T. E. Cambridge, Nov.* 21.

ART. III. *Queries and Answers.*

BEWICK's Relics. — Sir, Shortly after the death of Bewick, a paragraph appeared in several of the London and provincial papers, copied, I believe, originally from the *Tyne Mercury*, which stated that " Mr. Bewick had left unfinished a history of fishes, and a memoir of his own life, with portraits of his friends, and a large cut of an old hunter, which was the last work he employed himself upon only a few days before his death." Being a great admirer of the works of this justly celebrated artist (painter, I may call him), I should be glad to know whether the above statement is correct, and still more, whether there is any chance of the relics alluded to being published. Not one of the efforts of his wonderful genius should be lost to the world. Perhaps Mr. Dovaston may be able to give the information required; and, by doing so, he would much oblige, Yours, &c. — *W. T. Bree. Allesley Rectory, Nov.* 30. 1829.

P.S. Since writing the above, I have examined a copy of Bewick's *Birds*, published in 1826, and I there find some species figured and described at the end of the volumes, under the title of " Addenda," over and above those which were published in the Supplement in 1821. The last edition of the *Quadrupeds* also contains many cuts and vignettes which do not occur in the early ones. Would it not be almost an act of justice to publish these addenda in a separate volume, so as to enable the purchasers of the early editions to enjoy the benefit of them? They might all be appended to what, I hope, will, ere long, be given to the public under some such title as *Bewick's Remains;* viz., a volume containing all the works the artist left unpublished at the time of his death, including also such of the birds and quadrupeds, and vignettes, as do not occur in the earlier editions of his works. There is no doubt such a volume would sell; and, I trust, his heirs or executors will lose no time in taking it in hand. — *W. T. B.*

Anatomical Preparations, it is said by some, are not kept in rectified spirits of wine. Perhaps some of your readers will inform me whether any other liquid be preferable on account of quality or price. — *B. Maund. Bromsgrove, Oct.* 24. 1829.

To preserve reptiles, three parts of distilled water may be added to one part of alcohol; or equal parts of rectified spirit of wine and distilled water are preferable; these proportions will be found sufficiently strong to preserve reptiles or fishes, and have the additional advantage of not destroying colours. I believe either of these mixtures will preserve anatomical preparations. — *Y. L. Nov.* 2. 1829.

The Black-headed Bunting (in answer to T. G. Clithero, Vol. II. p. 289.) — This I have always considered to be the reed bunting (Emberìza Schœnìclus, *Bewick*, vol. i. p. 176. edit. 6. 1826) found in the fens and marshes. It may, probably, migrate into some other part of the kingdom, as I do not recollect to have ever seen one in the winter. Another bird, called the blackcap, is Motacílla Atricapílla, which is certainly a summer visitor. — *J. Lakes. Liskeard Vicarage, Cornwall, Aug.*15. 1829.

What Bird is Muscícapa luctuòsa (Vol. II. p. 274.)? I can find none such in Bewick. The only species known here is M. *Grìsola*. — *Id.*

Muscícapa luctuòsa of Temminck is the Pied Flycatcher, Muscícapa Atricapílla of Linn. Gmel. and Latham. For an excellent figure see Bewick, *British Birds*, vol. i. p. 207. I perceive you have already given a figure, Vol. I. p. 331. — *S. T. P. Nov.* 2. 1829.

To soften the Skins of Birds (in answer to J. A. H., Vol. II. p. 484.)— Wrap the feet of the bird in a damp cloth, and put a piece of linen dipped in water, with the water wrung out, in the body of the bird, and moistened cotton in the eyes.—*A. Z. Nov.* 5. 1829.

Softening the Skins of Birds.—For the information of your correspondent J. A. H. (Vol.II. p. 484.), I beg to inform you that a friend of mine, who is in the habit of occasionally receiving the skins of birds in a dry state from South America, always puts them into a cellar for a few days previously to stuffing them, to render the skin soft. I am, Sir, &c.—*H. Gray's Inn, Nov.* 23. 1829.

A small Bird reputed to be a Humming-Bird.—The small bird met with in the western parts of Devonshire, and reputed, from its diminutive size, to be a humming-bird (Vol. II. p. 402.), I should have little doubt must be the golden-crested wren, which is the smallest of our British birds, and answers the remainder of the description by frequently making its "pendent bed and procreant cradle" on the extreme branches of some fir or other tree.—*W. T. Bree. Rectory, Allesley, Sept.* 8. 1829.

Winter Quarters of Frogs (Vol. II. p. 103. 289.).—Sir, The following fact relative to this subject may, perhaps, be acceptable. In draining a bog or springy piece of ground in the winter 1813-14 (during the frost), I discovered a large quantity, some hundreds I suppose, embedded about three feet below the surface, in the head or source of a more than usually strong spring. Upon being uncovered they appeared very inactive, but not torpid or motionless, and attempted to bury themselves again in the sand, which, from the flowing of the water, was so easily separated as to admit a pole of considerable length to be run down it with a slight pressure. The cavity in which they were, and which apparently was formed by them, was so placed that the water of the spring flowed through it, and prevented their feeling the effects of the frost. In cleaning ditches or stagnant ponds during the winter, I have never seen any but at the bottom of ponds, in which, I am told, they are common. Are we not to infer from this that they instinctively seek springs, as the water is less liable to freeze; and, as they were in the instance mentioned capable of moving, that they do not hybernate or become torpid during the winter, but that they respire in water, or in their hiding places? I have never observed them in ditches or pools until near their spawning time, viz. after a few warm days in February or March, when their "*croaking* is considered the precursor of spring and provocative of sport" to boys; after which the embryo frogs appear as black spots in a large mass of gelatinous matter. I am, Sir, &c.—*J. F. B. Aug.* 29. 1829.

Skate Spawn.—What are these gelatinous masses so prevalent on our coasts, and called by the vulgar, skate spawn? It is impossible for any one to walk along this part of the coast, and not to be struck with the great abundance of these large, transparent, jelly-like masses, the exuviæ of every tide. A few days ago I had an opportunity of seeing one of these in its natural element, left by the ebb, in a shallow tank of clear water, and exhibiting a degree of sensific and motific power far beyond what I should have expected to have found in such an assemblage of negative organisation. The masses vary in bulk, and may weigh from four ounces to two pounds. On the beach they are a solid and quivering lump, having one side convex and perfectly smooth, the other cupped in its centre; the cup of the largest is about two inches in diameter, hard and cartilaginous at the bottom, with the appearance of four quadrangular tentacula nearly even with the surface. It was the first time I had ever seen one of these in water, and I was attracted by its well defined outline and graceful movements; it was lying at the bottom upon its convex side, and the cup, which on the beach is about one fifth of its whole diameter, and would hold not more than an ounce of water, was now expanded to its entire diameter, and would contain at least a pint. The movements perceptible were in the margin of the cup, and consisted of undulating oscillations, *introrsum et extrorsum*, and rendered more evident by the margin of the cup being furnished with fine waving fimbriæ. The animal gradually thickens from the margin down to the centre, and the movements are effected by gentle contractions and dilatations, which, when swimming, are alternately stronger on either side as the direction of the animal requires, the contractions having rather a spiral inclination. The whole is perfectly transparent, at least interrupted only by distant tendinous-looking lines rising vertically from its centre. On bringing it to the surface it commenced a retreat to the margin of the tank, swimming slowly, with its concavity inclining forwards, and then settling at the bottom; on raising it again, and turning up its convex side, it righted itself and sank; on touching it, when at the bottom, it shrank from the touch, and moved forward a few inches. Any information on this subject in your interesting Magazine will oblige, Yours, &c.—*John Brown, F.L.S. Boston L., Aug.* 22.

Whether a Fish called the Samlet ever becomes a Salmon or not, is a question not yet satisfactorily answered. I think I could give circumstantial, if not positive, proof that it does. William V. Ellis, Esq., of Minsterworth, near Gloucester, who has a very extensive fishery on the river Severn, is of opinion, from information received from fishermen under his direction, that the samlet *does* ultimately become a salmon, in confirmation of which, he says, one of the fishermen thrust a wire through the tail of a samlet, and in process of time (notwithstanding the corrosion and action of the fresh and sea-water on the wire) the same was again taken with the wire in its tail after that it had become a salmon.—*Thomas Hawkins. The Haw near Gloucester, Oct.* 21. 1829.

Whether the Botcher, the Gillion, and the Salmon are merely varieties or the same fish, or (as the fishermen here think) distinct species, is a question I should wish solved. I do not know whether these distinctive names are local or general, but, by whatever name they are called, I think they will be understood as distinct. My own opinion is, that they are the same fish at a distant period or stage of growth, or varieties only, and that the renovating influence of the sea-water is the only difference; but if I am wrong, I should wish to be better informed. — *Id.*

A Nidus attached to a Reed. — Sir, I shall be obliged by your giving me the name of the wonderful architect whose work is represented by the following sketch. (*fig.* 19.) It was found attached to a reed, in the inside of the roof of a barn at Crimplesham, in Norfolk. The sketch is of the natural size and colour [grey]. Besides the two coats seen in it, there is a third in the centre, but not so deep as either of the others; and within that six or seven hexagonal cells, like those of the honey bee (*Apis* mellifica), but not, I think, quite so large. The material of which this curious nidus is formed, ap-

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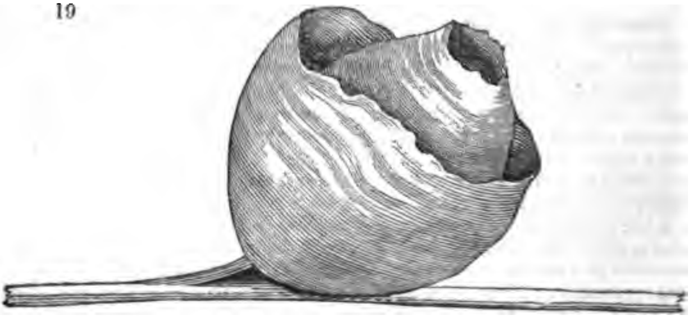
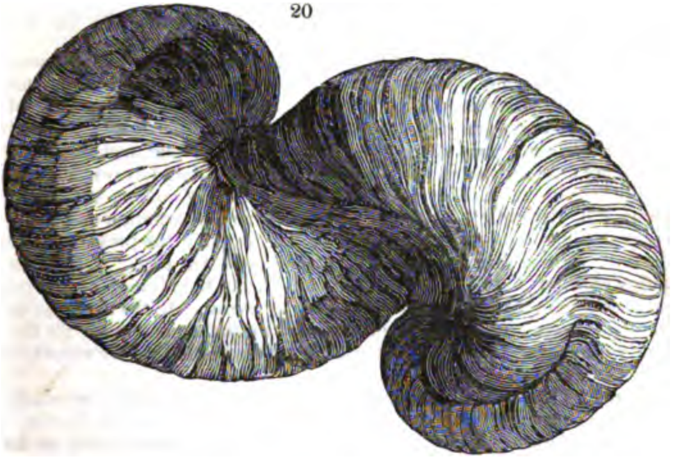


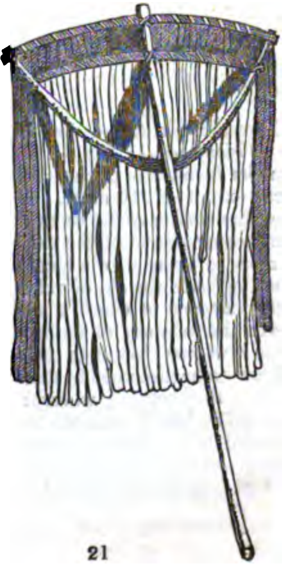
pears to be masticated wood or straw, mixed up with some glutinous fluid, and having altogether an appearance not unlike the grey bibulous paper in which slate pencils are enveloped, but not so thick by half. — *G. M. Lynn Regis, Sept.* 3. 1829. answer p. 195, 476.

Cucúllus símplex. — Sir, The following is a drawing (*fig.* 20.) of two fossil shells in my possession, which appear to be the Cucúllus símplex of Rumphius (tabula 59. litera B). They are firmly united together; but whether the *connection* was of a tenderer nature at first, than it is at present, I must leave to the learned to determine. Yours, &c. — *F. R. S. Oct.* 1829.

20



Ladanum was procured in the time of Dioscorides by goats, as your correspondent, Professor Thomson, observes (Vol. II. p. 408.); but Tournefort informs us that it is now gathered by means of a sort of whip, made of leather thongs, fastened in two rows to a long handle, of which he gives an engraving. (*fig.* 21.) When Tournefort was in Crete he went to visit the district where the ledon, or Cístus créticus, grows, and saw a set of peasants, in the hottest time of the day, busily employed in flogging the shrubs with these whips, till they were covered with the ladanum, and they then scraped off the gum and prepared it in lumps for sale. — *P. in B. August.* 1829.



21

Fall of the Leaf in Evergreens. — Do fir trees, laurels, box, holly, and other evergreens, shed and renew their leaves annually; and, if they do, how and when does the process take place, as they never appear devoid of leaves? — *M. F. Oct.* 1829.

Mr. Tatem's Method of making Meteorological Observations. — Sir, Allow me to beg a space in your valuable pages, to reply to the remarks of your intelligent correspondent, Mr. Gorrie of Annat Gardens, Perthshire, on my meteorological observations for last year.

That I have always considered uniformity in the manner in which observations should be made by meteorologists, not only with respect to time, but as regards instruments of similar construction, of the greatest importance, I need only refer to a letter written by me, in February, 1823 (see *Monthly Magazine*, vol. lv. p. 207.), recommending the establishment of a Meteorological Society in the metropolis; and I should be most happy, at any time, to assist in the arrangement of some plan by which that desirable object could be obtained.

I will now proceed, without further preface, to state the method practised by me in making my observations. The thermometer and barometer are examined every day at 8 A. M., 3 P. M. (esteemed the hottest period of the day), and 10 P. M., and the extreme of cold is ascertained by a self-registering *thermometer;* thus giving four observations of that instrument, all of which are duly registered, and the monthly mean is found by dividing the sum of all these by the number of observations, which, of course, varies with the number of days in each month. The rain and evaporation are measured every morning at 8 o'clock, and the wind reported, if the prevailing wind of the day. From this statement, Mr. Gorrie will see that "I refer to the *daily extremes*." The annual mean results from the division of the sum of the monthly means by 12, or is the *mean of means*. If the averages of the *monthly extremes* had been alone attended to, the annual mean for the last year would have been lower than even that recorded in my report, being only 47·6041.

I subjoin the annual temperature for the last seven years, by which the similitude between the years 1826 and 1828, noticed by Mr. Gorrie, very evidently appears. It would be extremely gratifying to me, and, no doubt, equally to your other meteorological readers, if Mr. Gorrie would favour us with the course pursued by him, in making his observations, and it might prove conducive to the adoption of some regular plan of observation among meteorologists, at any rate among those who correspond with the Magazine of Natural History.

Annual mean for	1822	46·51°
	1823	44·26
	1824	46·11
	1825	46·81
	1826	47·37
	1827	46·25
	1828	47·75

I remain, Sir, &c. — *James G. Tatem. Wycombe, May* 21. 1829.

Vision over the Sea. — Sir, It is stated (Vol. II. p. 470.) that a person, under favourable circumstances, could see over the surface of the ocean to the extent of 150 miles. I would ask under what circumstances an object on the surface of the earth or sea would be visible at that distance; as, from the convex form of the earth, it would require an elevation of nearly three miles to bring it to a level with the horizon, or within the line of vision, setting aside the aid of refraction. Perhaps the limit of vision is unknown, the distance at which a body may be seen appearing to depend upon its size, the intensity of its light, and the state of the medium through which the rays pass from it to the eye; as the planets, though too remote for their figure to be discerned by the unassisted eye, are yet conspicuous from the light which they reflect; whereas the fixed stars, from their immense distance, would be totally invisible to us, if, like the planets, they shone only by reflected light. Perhaps some correspondent may furnish some useful information on the subject, and oblige, among others, your obedient servant, — *T. E. Southwark, Dec.* 4. 1829.

THE MAGAZINE

OF

NATURAL HISTORY.

MARCH, 1830.

Art. I. *Some Account of the Life, Genius, and Personal Habits of the late Thomas Bewick, the celebrated Artist and Engraver on Wood.* By his Friend John F. M. Dovaston, Esq. A.M., of Westfelton, near Shrewsbury.

(*Concluded from* p. 9.)

> "Swote hys tyngue as the throstle's note,
> Quycke ynn daunce as thoughte canne bee,
> Defte hys taboure, codgelle stote,
> Oh! hee lyes bie the wyllowe tree:
> Mie love ys dedde,
> Gone to hys deathe-bedde,
> Alle vnderre the wyllowe tree." Chatterton.

Sir,

Before I conclude this familiar account of my friend Bewick, you must, in justice, allow me to inform the public, that it was commenced, and (after its first portion) very considerably lengthened, at your request. Yet still, under the continual fear of dilation, I reluctantly omit innumerable incidents that are sparkling about the twilight of my memory, and hurry on to my last interview with my esteemed friend. Early in June, 1827, he wrote to me from Buxton, that, for the gout in his stomach, he was hurried there by his medical friends, accompanied by his daughters Jane and Isabella. At sunrise I mounted the high-pacing Rosalind, and entered that naked but neat little town early the second morning; alighting at the Eagle — fit sign to a visitor of the king of bird-engravers.

In my haste to find his lodging, I passed it; but stumping behind, with his great cudgel, he seized me ardently by the arm before I was aware, exclaiming, "I seed ye from tha window, and kenned yer back and gait, my kind friend." I found him in very good lodgings facing the fountain-corner of the superb Crescent, nearly opposite the Old Hall; and, after the fervid raptures of again meeting, we settled down into our usual chit-chat. There were three windows in the front room, the ledges and shutters whereof he had pencilled all over with funny characters, as he saw them pass to and fro, visiting the well. These people were the source of great amusement: the probable histories of whom, and how they came by their ailings, he would humorously narrate, and sketch their figures and features in one instant of time. I have seen him draw a striking likeness on his thumb-nail, in one moment; wipe it off with his tongue, and instantly draw another. He told me that, at watering-places, if his name were known, he was pestered with people staring at him, and inflicting foolish questions; and he cautioned me always in public to call him the "old gentleman." We dined occasionally at the public table; and one day, over the wine, a dispute arose between two gentlemen about a bird; but was soon terminated by the one affirming he had compared it with the figure and description of Bewick, to which the other replied that Bewick was next to Nature. Here the old gentleman seized me by the thigh with his very hand-vice of a grasp; and I contrived to keep up the shuttlecock of conversation playfully to his highest satisfaction, though they who praised him so ardently, little imagined whose ears imbibed all their honest incense. On evenings we often smoked in the open windows of his pleasant lodgings, and chatted in all the luxury of intellectual leisure. A cocky wren ran, like a mouse, along the ledge of the window. "Now," says he, "when that little fellow sings, he sings *heartily!*" Upon which the merry little creature, as if conscious of our conviviality, and of who heard him, perched on a post, and trilled his shrilly treble with thrilling might and main. Of nights we had music, the young ladies sang, or we read marvellous or merry ballads, or again relapsed into our pleasantries; fully agreeing with the piquant and pithy Venusian poet, that fun is no foe to philosophy, to mix short sallies with our serious discourse, and nothing so sweet as to play the fool when fitting.

"Misce stultitiam consiliis brevem:
Dulce est desipere in loco."

Of mornings he walked out before the gnats and butterflies (as he called the company) began to frisk: for his most satirical arrows, though always pointed, were never envenomed; mere birdbolts, that he playfully and smartly squandered, not for prey but pastime. There was a neat, clean, pretty damsel that waited on the lodgers, to whom he gave little history books and prints of animals, joking her about her sweetheart; and as he always rose very early to "*waak oot,*" one morning, on the stairs, I asked Sally if the old gentleman had walked out. "Yes, sir;" said the good-humoured girl, "and a very nice old gentleman he is." I walked after him, and found him in a place they call the grove (a long, thin, narrow belt of stunted larches), playing with a group of curly rosy children, for whom he was drawing funny figures on a painted bench, and telling them the names of birds, insects, and plants. Many of his opinions, though dropped at different times and places, I may as well group together; and omit, in some degree, his peculiar dialect, as difficult to express on paper, and awkward to those who knew him not; though, to my ear, it always seemed to give point, potency, and a sort of Doric beauty to his aphoristic truths. On my remarking that the pig-parsnep (*Heraclèum* Sphondýlium), or hogweed, had always been a great favourite with me, as being by far the best foliage for painters' foreground, he not only concurred, but ingeniously explained the reason. The hemlock and parsley-leaved plants, he said, were too minutely cut and divaricated; and the butter-bur and docks too round and heavy: now, the pig-parsnep uniting the lightness of the one with the strength of the other, became instantly pleasing to the eye of taste. He said, of all birds he thought the dove tribe most beautiful. Their outline presents every possible variety of the line of beauty; their colours are brilliant and varied; their notes amorous and soothing; their manners gentle and affectionate; their flight both rapid and graceful; and, in all times and nations, they have been emblems of peace, love, and fidelity. They have, moreover, many qualities and habits exclusively peculiar to their tribe; they drink differently (by immersion), and have no gall. Of Lord Byron's poetry he spoke with great disgust, saying, it teemed with less imagination, and more trash, in any quantity, than that of any other great poet; that power was the prominent feature of his mind, which he prostituted; and the great failing of his heart was depravity, which he adorned. He thought the romances of Sir Walter Scott breathed very large and frequent aspirations of the genuine essence of poetry; that his landscapes and figures were spirited and highly coloured painting, and his real characters the finest specimens of historical portraits. Paradise, he said, was of every man's own making; all evil caused by the abuse of freewill; happiness equally distributed, and in every one's reach. "Oh!" said he, "this is a bonny world as God made it; but man makes a packhorse of Providence." He held that innumerable things might be converted to our use that we ignorantly neglect;

and quoted, with great ardour, the whole of Friar Laurence's speech in *Romeo and Juliet*, to that effect. In corroboration of this, one day, at the mouth of Poole's Hole, which, on account of the chilly damp and dripping of the cavern, he declined to enter with me and the young ladies; while we were exploring the strange and fantastic formations of calcareous tufa therein, the *Flitch of Bacon*, the *Saddle*, and *Mary Stuart's Pillar* (which, it is said, she went quite round when a prisoner at Chatsworth), I found, on our emerging, he had collected his handkerchief full of nettle-tops, which, when boiled, he ate in his soup, methought with very keen relish. It was on our walk back, for some joke I cracked, they promised me a collection of all his engravings on India paper, which, at the time, I thought a joke too; yet, valuable and expensive as was the promise, I, in due time, found it faithfully and affectionately performed.

One night he expressed a busy desire to see that tremendous and far-famed cavern, about ten miles from Buxton, called *The Devil's Arse i' th' Peak;* for his healthy mind was disgusted with the ridiculous, squeamy, and mawkish affectation of calling it "Peak's Hole," without, in the least, diluting the slight indelicacy of the ancient name, for which the witty combination amply compounds. In the morning, I readily engaged a vehicle and driver, wherein we comfortably sat, two and two, face to face; and were soon a-gig, by the pretty village of Fairfield, jaunting merrily o'er the bare and smooth, but sunny mountains of Derbyshire. This excursion alone would afford my pen more anecdotes than all I have recorded, had I room to relate; but I (somewhat reluctantly) confine myself to such as illustrate the versatile mind of my imaginative and merry companion, which I deem far more finely and firmly delineated by these trifles, than by church-tables of benefactions in golden capitals, or glaring lapidary epitaphs of his virtues in cold dull marble. For his mind, like the sun in his annual and diurnal rounds, was continually, and, as it were, cunningly catching unthought of objects, and piercing nooks and corners unnoticed; steeping for a moment, with its mellow rays, interior walls and chilly pillars; edges of forest glens, and trees in deep groves; marbling a chamber panel through a waving willow; or glowing on some ancient post in the gloomy recess of an old hall: thus not only calling the eye to what it would otherwise miss, but shedding on the most common objects, for the time, a soothing and a celestial gleam. As we rumbled along by the curious "Dove-holes" of that river on one side, and the "Shivering Rock" of Mam Tor on the other, I observed him silent for a short time, with his keen and comic eye fixed on the fern and licheny stones of the mountain side, that slept in the warm and broad noon sunshine. "I ha' bin glowring a' the while," said he, "for a ring ouzel (*Tùrdus* torquàtus): this is the vara sort o' habitat for him. Did ya ever see him alive?" "Yes, Sir, at Llangollen in Wales, and on the rugged heights of the Breidden mountains, near my residence at Westfelton." "Pretty chiel," continued he, turning his prodigious quid, "I wish I could once see him." On arriving at Castleton, we ordered dinner to be carried up to the ruins of Peveril's Castle, at a considerable altitude immediately over the mouth or entrance of the immense cavern, towards which we leisurely walked; and having passed a ladies' boarding-school ("teachers of inutilities, to say no worse," as he called them) very near it, his merry mind elicited a broad joke. "What a place," cries he (as their advertisements actually now word it), "for a lady to open her seminary for the reception of pupils!" He then roared such a hearty cachinnation, that the Devil's Cavern reverberated from its windy intestines. It would be superfluous here, and indeed onerous, to attempt any description of either the exterior or interior of this dismal, extensive, and wonderful cavern; after the examination of which, we all clambered up to the castle of the renowned Peveril of the Peak, amid the weedy ruins of whose deserted halls, on the smooth green sward, we picked our mutton bones, and quaffed our foaming porter, with sweeter appetite, zest, and happiness, than is often enjoyed at the banquet boards of those miscalled the great. After dinner, the ladies collected fossil specimens in their little baskets, or gathered bluebells, cranesbills, pansies, and yellow violets; twining flowers in their hair or summer-hats, while the jolly old bawcock and I blew a delicious pipe of Virginia. In a moment, with their lunular breasts, two ring-ouzels alit among the gillyflowers on the wall; and, the same moment, Bewick silently grasped my arm, at once to suppress motion and speech. After a minute's perking, preening, and turning, they flew away; on which, in ecstasy of delight, he three times tenderly exclaimed, "Pretty darlings! pretty darlings! pretty darlings!" About this time he was dading through the press the sixth edition of his *Birds;* and, though a little anecdote connected therewith tells plaguily against me, I feel it a duty to record it. He put into my hand a proof-sheet and copy, for correction, as I had some hand in the contents. But, independent of typographic errors, finding several alterations, additions, and omissions, I became pettish; and, on his gently remonstrating, I furiously tore both proof and copy to very tatters, trampled them on the floor, cursed them, and called the reviser a fool. All this while he walked deliberately to and fro; but, on seeing this magnanimous exploit of my folly, he paused, and slowly (oh! the devil take his assumed slowness!) said, "Measter Dovaston, ye ha' ca'd him a feool ye dinna ken; I only ax, if he were here, what might he ca' you?" He did, indeed, *ax* me, and with an edge; for his just and gentle reproof was darted from one of those significant smiles, more severe than the bitterest anger. The young ladies were picking up the *disjecta membra* of these unfortunate papers, and arranging them on the table, like the pieces of a child's dissected map. "Na, na," said he, blowing them off at one fell puff, like Boreas in a snow storm; "na, na; as the daft callant thinks himsel' sae clever, let him e'en compose fresh copy;" throwing a quire on the table, and an old *stumpie* of a pen he had been using as a pipe-cleaner: to which task I doggedly sat down, with the subdued feelings of a chid schoolboy, having occasional recourse to the accursed scraps; while, through the window, I saw the glorious *old gentleman* walking lustily down to the well, flourishing his cudgel, in all the vigour of victory. My fair Northumbrian friends (alas! so many hundred miles remote from the hand now writing it) will readily, on perusal, acknowledge the minute truth with which I have let off this little *miff;* and will, I trust, bear testimony to the accuracy of all my anecdotes; which, so far from needing any colour, or even sharpening, I am conscious appear best in their own native simplicity, when least adorned. Every body loved Bewick. All animals loved him; and frequently, o' mornings, I found him in the inn-yard, among the dogs, ducks, or pigs, throwing them pieces of biscuit, and talking to them, or to the boors beside them, waiters, *chay*-boys, or boots. He would pat Rosalind on the neck, ask her how she liked her crazy master, and bid the ostler bring her a bucket of water. "She has had enough, Sir," said he. "Then bring her more," said Bewick. He did so, and she drank part of it. "There," says he, "she will na drink mair than her need, like you, or me, or my daft friend here."

Persons enamoured of Nature, though one of her voluminous treasures may for a while be the favourite, seldom confine their observance or admiration to that one exclusively; but, in their eager pursuit after the main object of their enthusiasm, glance oft aside on others of equal excitement or beauty, that, in time and turn, come to an equal share of regard and rapture. This was quite the case with Bewick, who, from infancy, had contemplated, with adoration, whatever the sun illumined; whether he lit up in serene splendour the ponderous planets of heaven, or emblazoned, in golden emeralds, the panoply of the smallest insects of earth. He fully felt that organised orbs or atoms tell equally of their ineffable Architect: and this it was his incessant desire to impress on the minds of all. Having exhausted the quadrupeds and British birds as vehicles to his art, instruction, and amusements, he, late in life, took up a fervent resolution to engrave all the British *Fishes*, and write their histories. To this his mind was well trained, having been ever a lover of the fountains and rills, the still pools and broad waters, the majestic rivers and the mighty ocean. Here he felt the seeds of his talent stirring all a-life, where he should have to display the beauties of the finny tribe, and treat of the wonders of the great deep. When I was last in Northumberland, they showed me *thirty* fishes he had cut by way of trial, with the spirit and execution whereof himself was well satisfied, and his judicious friends enraptured; together with more than a hundred tail-pieces, conceived and cut, "ay, every inch," with all his usual imaginative appropriation and power. His mind and conversation now dwelt forcibly and fondly upon this work, which it was his extreme wish to see complete, and then placidly to resign his soul to his Creator, the short and nearing approach to whom he contemplated with even cheerful contentedness. His art here got entirely into a new element; for, as he was forced to show the fishes *out* of water, he was deprived of his favourite excellence, *motion;* yet such motion as a fish new-landed *has*, he has given with elasticity and life: brilliance to the scaly, and lubricity to the smooth; so as to remind the naturalist of excellent old Chaucer's touches of nature, where

> "They swommin full of smalé fishes lighte,
> With finnis rede, and scalis silver brighte."

A single impression of his John Dorée sold lately in London for ten guineas. And when they do come out, though every admirer will lament he was, long ere completion, called to his blessed account, their sorrow will be softened at beholding with what effect and spirit his animated graver has been caught up by his son. We love to talk over sweet or bitter adventures; for the ruminating mind, chewing the *cud* of past life, extracts a cordial from the one, and a salubrity from the other, which we are ever desirous of imparting: so that I feel as heavy at taking leave of my narrative of these pleasures, as I was of the bright and alluring friends by whom they were enkindled. But "good times, bad times, and all times get over;" and morning after morning was named for my retracing my long and lonely journey. I had never parted from him without our reciprocally thinking it would be the last; but this time we both thought otherwise, for his health was very much ameliorated. Black Monday at length came; and though the sun shone broad on every thing around, they walked slowly, and methought strangely silent, with me (I leading Rosalind, heavy as a nightmare), about two miles on the road, where, after saluting the young ladies, and shaking the good old Bewick's hand, though I hope to enjoy *their* friendship yet many years, it was on that mountain side that with *him* I parted for ever; and looking back, till the road turned the corner of a rock, dimly saw them kindly gazing after me: and this was the last time I ever beheld the portly person of my benevolent and beloved friend. We continued, however, to correspond frequently; not only on natural history, but (as the Irish scholar said) "de omnibus rebus, et *quibusdam aliis*," on the manners of both feathered and unfeathered bipeds. The next summer, he visited London about his works: and thence he wrote me several very humorous letters on the utterly artificial life of the cockneys; with the mass of whom, since he was among them half a century before, he thought *the march of intellect* had not equalled *the march of impudence.* He was, however, very honourably received by many learned societies and individuals, of whom, and of whose collections, he wrote in raptures. On his return, the London and provincial papers had many paragraphs respecting this visit, his reception, and his life; to amend the errors of which statements, I must have been writing one at the very hour of his death; for I had not time to stop its insertion in one of the Shrewsbury papers, when I received a short, but most affectionate and affecting letter from his son, informing me, "as his father's most valued friend," that he expired, in full possession of his fine and powerful mental faculties, in quiet and cheerful resignation, on the 8th of November, 1828. On the morning of his death, he had the satisfaction of seeing the first proof-impression of a series of large wood-engravings he had undertaken, in a superior style, for the walls of farm-houses, inns, and cottages, with a view to abate cruelty, mitigate pain, and imbue the mind and heart with tenderness and humanity; and this he called his last legacy to suffering and insulted Nature.

I strongly feel that some apology is due to the public for the freedom, haste, and familiarity with which I have thrown off these pages; and I cannot better express it than by a stanza from fine old Spenser, and which my intrepid and ingenious friend frequently applied to his own works: —

> "Let none then blame me, if in discipline
> Of vertue and of civil uses lore,
> I do not form them to the common line
> Of present dayes, which are corrupted sore,
> But to the antique use, which was of yore,
> When good was onlie for itself desired,
> And all men sought their own, and none no more;
> When Justice was not for most meed out-hired,
> But simple Truth did reign, and was of all admired."
> *Fairie Queen*, book iv. st. 3. (Prologue.)

And thus, Sir, I conclude my scanty and scattered selections from a multitude of reminiscences of this truly great and good man; which are fixed as points in my mind, whereon to spread the vividly coloured tissue of reflection; stepping-stones in the sunny, broad, and brilliant *reach* of life's varying current, as it passes through scenery that stirs delicious impulses throughout the delighted spirit; and, as memory hereafter sets her light foot on either of them, a kindred spirit will depict to the mind's eye the gleaming vision, and awaken the music of past harmonies in the mind's ear, creating in the bosom a reflection of all the luxuriant amenities of fairy-land.

I am, Sir, &c.

Westfelton, near Shrewsbury, JOHN F. M. DOVASTON.
Dec. 30. 1829.

ART. II. *On the Geography, Geology, and Vegetation of Sicily.* By JOHN HOGG, Esq. M.A. F.L.S. F.C.P.S.

Sir,

ON making a tour in Sicily in the spring of 1826, I formed a catalogue of all the plants I met with, which are either indigenous, or which have now become naturalised in the island. Supposing that it might not be altogether unacceptable to the botanist, since no *Flora Sicula* had at that time been published. But the object of my imperfect list has now been superseded by two Sicilian Floras* that have been given to the world within the last two years.

The following pages, chiefly compiled from accurate and authentic sources, will only attempt to give some account of

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* Presl, Carol. B. — Flora Sicula, exhibens Plantas Vasculosas in Siciliâ aut spontè crescentes, aut frequentissimè cultas, secundum Systema Naturale digestas. Pragæ. 1826. — The first volume has only been published.

Gussone Ioanne. — Floræ Siculæ Prodromus, sive Plantarum in Siciliâ Ulteriori nascentium Enumeratio, secundum Systema Linnæanum. Naples. 2 vols. 1827-8. — This work cannot yet be obtained in England.

Sicily with respect to its geography, mineralogy, geology, and vegetation.

Sicily, as its ancient names Trinacria and Triquetra signify, is in the form of a triangle having unequal sides, extending from 12° 2′ to 15° 42′ longitude east of Greenwich, and from 36° 39′ to 38° 18′ north latitude. The north side of the island is the largest, being 215 Italian miles in length; the least is the east side, which is 145 miles; and the third, or south, is 190 miles in length. Hence, the whole circuit of it contains 550 Italian miles, or about 600, if the space occupied by the promontories and bays be included, according to Professor Farrara's estimation; but Dr. Presl computes it at 624 Italian, or 156 geographical miles, and the whole surface 587½ square miles. The population of the island is estimated at 1,645,000 nearly (Smyth). The number of inhabitants of the four principal cities are: first, of Palermo, 167,505, according to the census taken January 1. 1826; second, of Catania, 80,000; third, of Messina, 30,000; and fourth, of Syracuse, 20,000.

The situation of Sicily between Spain, Africa, and Greece, is very advantageous towards possessing a delightful climate. Cape Granitola, or as it is also named Punto di Sorello, not far from the ruins of Selinunte, is only 80 miles distant from Cape Bon in Africa. From Cape Passaro, formerly the Promontory of Pachinus, to La Valetta in Malta, 56 miles. Syracuse is distant from Santa Maura 176 miles, from Corfu 256, and from Zante 255 miles. From Taormina to Cape Matapan in the Morea, 352. Capo di Faro, the ancient Promontory of Pelorus, is 2½ Italian miles to the coast of Calabria. The lighthouse of Milazzo to the Island of Lipari, 17; and to Stromboli, 32 nautic miles. From Cape St. Vito to Cagliari, the capital of Sardinia, are 182 nautic miles. According to Captain Smyth, the medium height of the thermometer of Fahrenheit is 62·5°; in the hottest weather it rises to 92°, but seldom is lower than 36°, even in the depth of winter. The barometer has for its mean height 29·800 English inches; and the pluviometer 26 in. Professor Scina observes, in his *Topografia di Palermo*, 1818, that the mean annual height of the thermometer of Reaumur, in that city (Palermo), was 14·4°. The mean temperature, in January and February = 8·9° R., in July and August = 19·8°. In the severest cold during twenty years, the thermometer never exceeded + 0.2° R., and was never less than 3·3°. The extreme heat not more than 33·3° R., and not less than 24°. The mean height of the pluviometer, for the same number of years, 22·149 English inches. The medium height of the barometer in one year

= 29·808 English inches. It should be mentioned that the observatory in Palermo is situated 38° 6′ 44″ north lat., and 13° 20′ 15″ long. east of Greenwich. (Smyth.)

Sicily abounds in lofty mountains and extensive plains. On the north side rises the chain of the Nebrodes, now called Monti di Madonia; the highest of them reach the altitude of 610 toises (Ferrara), which equal 3660 Eng. ft., and extend nearly parallel along that coast; they are joined on the side next Italy by the Neptunian Range, or ancient Pelorias, which continue down the eastern coast, towards the lofty rocks of Taormina; rather to the north of the middle of this side of the island rises Mount Etna, the base of which occupies an immense tract of country. The summit of this mountain is in 37° 43′ 31″ N. lat. and 15° E. long. (Smyth.)

From this, in a direction further south towards Syracuse, continues the chain of the Hyblæan mountains. In the more central parts, and on the south, are the Monti Enna (now Castro-Giovanni), Artesinò, S. Vennera, Lauro, the two Calvari, M. delle Rose, Rocca di Entella, Rifesio, Calatrasi, Iato, Busamara, Macalubba, S. Calogero at Sciacca, &c.; on the west coast is Monte S. Giuliano, the former Eryx; the headland at Cape S. Vito is considerable, and sweeps round towards Palermo; the mountains likewise behind, and on the sides of the plain of Palermo, are very lofty. The most extensive plains are those of Milazzo, Catania, Lentini, Augusta, Calatagirone and Terra Nuova. There are numerous small rivers and torrents, which, in the summer, are quite dry. The river Giarretta, the ancient Simœthus, is the largest; and next to it are the Fiumi Salso and Grande, known in former times by the names of the Southern and Northern Himeræ.

There are many cold and warm mineral springs containing salt, magnesia, alum, iron, sulphur, bitumen, &c. Some small fresh-water lakes occur; but one near Palagonia, called Lago Naftia, produces much petroleum. The north side has, from its very irregular form, many capes, gulfs, and bays; as the Gulfs of Castell' a mare, of Palermo, of Patti; the Bays of Olivieri, Milazzo, &c.: the south and south-west, very few. but on the east there is the large Gulf of Catania. The whole island used to be divided into *three* parts, named valleys: Val di Noto, Val di Mazzara, and Val Demona; now the divisions are *seven*, viz. Valli di Palermo, Trapani, Girgenti, Calta nisetta, Syracusa, Catania, and Messina.

The aspect of Sicily is of course much varied; where there are many mountains, there are parts grand and romantic, particularly along the coast; but, in some of the more southern parts, the country is bare and uninteresting, wild and uninhabited; the plains are generally luxuriant, and covered with vegetation and cattle. Marsh land abounds in places, and there the deadly malaria is found during the hot weather. Nothing can exceed the beauty of the situation, and cultivation of the land about Messina, Catania, Syracuse, Palermo, &c., where nature displays, in exuberance, the fruit of the vine, the olive, the lemon, the orange, and other trees. The most extensive forests or woods are at Etna, Biscari, Caronia, Corleone, Gibelmanna, Noto, and Traina.

Respecting the geology of Sicily, I will add the following outline from Professor Ferrara [*]: —

The mountains of Pelorus have for their base granite and other primitive rocks. About these there extends an argillaceous schistose seam (clay slate), which succeeds to the granite, to the gneiss, and to the micaceous schistus (mica slate). In some places the argillaceous schisti are bituminous. It is in this formation that the metallic mines of Sicily are situated, and their seams extend themselves sometimes even among the gneiss: they are very rich in silver, lead, and copper. These soils are covered by, and placed in the middle of, the rocks which contain fragments of them: they form many species of aggregate rocks, which have for their cement a substance either argillaceo-ferruginous, or siliceous, or calcareous; these are evidently of a posterior formation. An immense calcareous deposition covers the whole island. The soils of the first formation, from the Faro of Messina to seventy miles towards the central places, disappear; and, except these, the whole surface of Sicily consists of the intermediate formation, or of the transition of Werner, and of others posterior to it. The aggregate rocks constitute heights, and great tracts of country; but all are subordinate to the calcareous formation. Few seams of primitive limestone occur amongst the gneiss, and there are some with pieces of mica. This calcareous rock is of a fine grain, grey, or bluish, phosphoric, containing alum and magnesia, and has a few remains of marine animals; the intermediate (transition) limestone finally covers it, and forms the greatest altitudes and long tracts of country. Upon and often by the side of this limestone we may observe that of a much finer grain, white, of a flinty fracture, and full of large pebbles, a little shining, with a great quantity of ancient marine animals. This secondary formation is more covered with a tertiary one, forming a somewhat calcareous tuff composed of the remains of marine animals, united by a weak cement, which is itself formed of minute pieces of the same. This shell limestone is easily worked, but it soon decays, and it may even be said to rot; and it renders the buildings in that calcareous country by no means durable. The earthy calcareous formation, which may also be called argillaceous marl, since it is mixed with siliceous earth and with clay, forms the small hills and extensive plains of Sicily: it is in this that deposits of shells of the ancient sea are discovered, masses of sulphuret of iron, and the mines of salt and of sulphur in which this island is so extremely rich. It is in this formation that the lavas of the ancient volcanoes are found buried around Etna, and in volcanic Sicily, which extends from Etna to Cape Passaro, where, in fact, besides the lavas buried in the earthy calcareous formation, or marl, there appear traces of the ancient fires of this part of the isle mixed with the shell limestone, and the beds alternate with it for a surprising number of times. Whereever these formations prevail, we find throughout Sicily masses of gypsum; they are observed in the intervals between the mountains of Pelorus, in the volcanic limestone of the south of Sicily, in the interior behind Alimena, where they constitute some miles of heights and of low lands, as well as in the west of the island. In the calcareous formations posterior to the primitive are found quartzose and siliceous pebbles, agates, jaspers, coloured stones, in which the island is extremely rich, and bituminous rocks, from which, most probably, naphtha exudes, and petroleum issues in many places. Pieces of amber and of asphaltum are found among the argillaceous beds. Beautiful crystallisations of sulphur, of sulphate of barytes, and of sulphate of strontian, are discovered in the clefts, and in the cavities in the sulphur mines. The limestone of all the formations, whenever it is sufficiently compact to receive a polish, affords the immense variety of marbles of different colours, for which Sicily is so very famous.

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[*] See Guida dei Viaggiatori in Sicilia (Palermo, 1822), p. 13—18.

The perfect resemblance * of the two opposite countries of Sicily and of Italy, and the continued direction of the range of Apennines, prove their ancient union, and compel us to consider the straits of Messina as a valley formed by the two ranges of mountains which extend parallel to each other, and into the interior of the two countries. The forces of nature acting in an ordinary manner could not produce this separation; it therefore, very probably, took place in the last catastrophe which modified the surface of our globe, and established the present system.

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* Dr. Daubeny observes on the gneiss of Messina, "This is the formation which probably extends on the Italian side of the straits, if I may judge from the specimens I brought from the celebrated rock of Scylla."

In order to elucidate more clearly the above account of the different formations, and of their position and extent, I will give this short description, taken from the excellent *Sketch of the Geology of Sicily*, by Dr. Daubeny. *

The geology of Sicily may conveniently be divided into three parts, corresponding nearly with the three sides of the triangle which represents the figure of the island. It contains rocks of the primitive, transition, secondary or flœtz, and tertiary classes.

The *first division* will comprehend the rocks from Messina (or rather from Taormina) to Trapani. These are primitive, transition, and secondary. The first are only found at the north-east corner near Messina, where the prevailing rock appears to be gneiss. The transition constitute a chain of hills, extending obliquely from Melazzo, on the north coast, to Taormina on the east. They consist chiefly of mica slate and clay slate, quartz rock, grey wacke, sandstone, and limestone. The secondary rocks are found principally in a line parallel with the north coast. They consist, first, of red sandstone, with beds of shale extending from Cape Orlando to Cape Cefalu; secondly, of a compact limestone, with beds of chert, jasper, and agate, which constitutes the Madonia mountains, and extends from Cefalu to Palermo, and from thence to Trapani. It perhaps corresponds with the magnesian limestone of England.

The *second division* embraces the rocks that occur near the western coast, from Trapani to Cape Passaro, the most southern point of the island, and consist chiefly of a series of formations which Dr. Daubeny is inclined to refer to the most recent epoch in the history of our planet, namely, that posterior to the formation of the chalk. These tertiary rocks consist, first, either of beds of blue clay and marl, containing much gypsum and selenite, sulphur, sulphate of strontian, alum, and common salt; secondly, of a calcareo-arenaceous breccia, replete with shells of a recent date, which is seen extensively on the western coast, at the level of the sea, and, as we trace it south, is found to rest on the blue clay; thirdly, of beds of shelly limestone, which occupy all the south of the island, and alternate repeatedly with beds of volcanic matter.

The *third division*, which takes in the line of coast on the east, from Cape Passaro to Taormina, exhibits indications of volcanic action, occurring at very different epochs, from the lavas which flowed during the period at which the tertiary beds were being deposited, to the comparatively recent eruptions that have taken place from Mount Etna. But the hill, on which are the ruins of Taormina, consists of a compact limestone resting on the mica slate, which stretches far into the interior, and constitutes a sort of boundary between the volcanic and Neptunian districts, a barrier beyond which the lavas of Etna have never yet penetrated.

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* See Jameson's Edinburgh Philosophical Journal, vol. 13. 1825.

We will now briefly describe the several formations of these *three* parts or divisions.

The granitic rocks of the Pelorian chain contain also embedded masses of a mixture of quartz and hornblende. They extend uninterruptedly as far as Melazzo. The peninsula on which the castle and town have been built is composed of well-marked gneiss, upon which there rests a compact greyish limestone containing fossil remains. This Dr. Daubeny conjectures to be of a recent origin. At Cape Minjivio (*Mons Jovis*), the mica slate alternates with a bluish crystalline limestone without shells, a granular rock, consisting principally of quartz and mica, which the author names quartzy rock, and a sandstone made up of minute fragments of the above two ingredients. The red sandstone which succeeds the slate formation is not micaceous, but contains red iron-shot grains of sand. This continues to Cefalu, except in places where it is interrupted by a bed or two of compact greyish limestone without petrifactions. The bold promontory of Cefalu consists of a bluish fetid limestone (called a *Lumachella* marble), and possessing organic remains. This formation, which rests upon the sandstone, extends to Trapani, including the Nebrodensian and Palermitan mountains. It contains magnesia. But the valleys and coast between Cefalu and Termini, about Palermo and Castell' a mare, are covered with a coarse pudding-stone, containing fragments of quartz, and of the magnesian limestone on which it rests, or of a calcareous breccia, in which sand is also present, and many fossils. The line of demarcation between this, and the older calcareous formation, is very distinctly marked by the character of vegetation. The compact limestone like that of the Apennines, or of Nismes * is chiefly adapted for the olive, and affords but a scanty pasturage, vegetation being obstructed by the fragments of chert; whereas the breccia affords the finest crops of corn, and is distinguished, even where uncultivated, by the luxuriance of the plants that grow upon it. This formation, though sometimes having a more arenaceous character, occurs along the western coast from Trapani to Sciacca; and a breccia of the same kind replete with shells, not far, if at all, removed from existing species, seems to fill up the hollows in most of the older rocks of Sicily. It exists at Messina, at Syracuse, from whence it proceeds along the shore in the direction of Catania, near Castro-Giovanni, and Girgenti, &c. Dr. Daubeny does not decide whether the breccia found on the hills in the interior of the island, is the same as that on the coast between Trapani and Selinunte, but the character of the rock as well as its embedded fossils appear to coincide.

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* To compare the geological structure of Sicily with that of the island of Sardinia, see *Mémoire Géologique sur l'Isle de Sardaigne par M. de la Marmora*, in the 11th volume of *Mémoires du Muséum d'Histoire Naturelle*. Where it appears that the east side, comprehending nearly one half of the island, is of primitive and transition rocks, consisting of granite, porphyry, and mica slate; the west side is composed of calcareous strata of the tertiary class, where volcanic rocks principally occur; and there is seen in some places a secondary limestone, which probably corresponds with that of the Palermitan and Madonian mountains.

The stratum on which this reposes is by far the most considerable in Sicily. Indeed, nearly half the surface of the island is constituted of this and the subordinate beds; as it extends from the neighbourhood of Palermo and Termini on the north, to Terra Nuova on the south, occupies nearly the whole of the centre, and proceeds on the east to the skirts of Etna. The predominating rock in this formation is a bluish plastic clay, with which are associated beds of gypsum, and masses of selenite, of blue limestone, of a dark brown slaty marl, of a white argillaceous limestone, frequently alternating with marl, and of a brecciated calcareous rock, with oval fragments of a white compact limestone. The blue clay rarely contains shells; it possesses crystals of sulphate of lime, of sulphate of strontian, and of native sulphur, rock-salt, alum, sulphate of barytes, copper pyrites, and iron.

The hill Macalubba near Girgenti is of blue clay, it is called the mud or air volcano, because at times it emits a quantity of gas, and throws up muddy water to a considerable height. A similar chemical action takes place in the Monte di S. Calogero behind Sciacca, where at its summit hot vapours * continually issue from numerous crevices and clefts. At its base are hot sulphureous baths, situated in the blue clay, but the mountain itself is a white saccharoid limestone of a compact nature, containing flint and shells. The blue clay formation the professor believes to be of a very recent date, belonging probably to the tertiary epoch, and is not related to the new red or muriatiferous sandstone of the north of Europe.

A series of tertiary rocks occupy the southern portion of the island, extending from Cape Passaro to the Lake Lentini, where they are interrupted by a diluvial tract, called the plain

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* It is also singular that the same phenomena occur in the mountains of Pantellaria, which is about seventy Italian miles distant to the south-west of Sciacca. That island is, according to Ferrara, altogether volcanic.

of Catania, but are seen again north of that district, near Catania and a few other places, where the rock has escaped the lavas of Etna. These beds may be traced uninterruptedly from Terra Nuova to Cape Passaro; they consist either of a soft earthy limestone, generally of a straw colour, which in some of its varieties resembles the beds occurring in the oolite of England, or of a breccia, in which nodules of a more compact limestone are embedded in the earthy basis before described. At Cape Passaro the fundamental rock is a volcanic tuff, covered towards the summit of the cliff by a bed of a more crystalline and compact limestone, containing numerous organic remains.

Two or three alternations of the volcanic and calcareous strata occur within a few miles of the Cape. From hence for thirty miles northwards, the limestone rocks continue without interruption; but the most numerous alternations are seen between Monte Vennera and Lentini.

On Mount Etna itself, it will be unnecessary to make any observations, therefore I will conclude with the opinion of Professor Daubeny, that " the volcanic rocks of Sicily are of *two* epochs at least, namely, *antediluvian*, which alternate with calcareous rocks, and *postdiluvian*, which comprise the greater part of the lavas that have flowed, at different times, from Mount Etna. It is probable that this mountain was burning at a period antecedent to the time of Homer; and there are volcanic rocks at its foot, which seem to have been produced before the commencement of the present order of things."

The following extract from the accurate *Memoir of Sicily*, by Capt. W. H. Smyth, R. N., will point out the localities of the principal Sicilian minerals: — " Masses of Pozzalana occur at Lentini, Vizzini, Palazzuolo, and Palica; and various substances, that have also evidently undergone the action of fire, are observable in several parts of the interior, where the superincumbent strata have been riven by torrents. The central divisions of the island contain large tracts of bitumen; and, though sulphur is rather a cause than a product of volcanoes, it may be noticed that it is found in immense quantities at Mussumeli, Cattolica, Girgenti, Naro, Mazzarino, and Alicata. In the neighbourhood of Regalmuto, Fiume di Nisi, Caccamo, Savoca, and San-Giuseppe, are found silver, lead, copper, cinnabar, marcasite, emery, and antimony. Auriferous pyrites, lapis lazuli, mercury, alum, and coal similar to that from Bovey in Devonshire, abound in the hills and valleys of Nicosia, Ali, Tortorici, and Messina.

" Rock-salt, bitumen, and gypsum, particularly the latter, abound at Castro-Giovanni, Mistretta, Caltanisetta, Ragusa, and other places; while marbles, agates, chalcedonies, and jaspers of great variety, occur at Palermo, Gagliano, Busacchino, Cappizzi, Naso, Taormina, and many other parts, intermixed with asbestos, asphaltum, a saponaceous stone consisting principally of argil, possessing strong detergent qualities, and alabaster; and specimens of Ostracites, Echinites, Cardites, and various other organic, dendritic, and amorphous remains are frequently found embedded in the calcareous strata. Petroleum and naphtha are found on the surface of several springs at Palagonia, Petralia, Girgenti, Leonforte, Bivona, Caltanisetta, and Segesta. Amber is found in small quantities, washed up by the sea, at the mouth of the river Giarretta. Around Ragusa in the county of Modica, there abounds, moreover, a bituminous * rock used for building stone, that produces a great proportion of hydrogen gas, far better for ignition than that extracted from coal. Mineral waters, both hot and cold, abound in every part of Sicily, and have for ages been celebrated for their efficacy in relieving various chronic, paralytic, and cutaneous disorders, of these the sulphureous are to be met with at Ali, Cefalu, Sciacca, Termini, Segesta, and Mazzarino; the ferruginous at S. Vito, Noto, Messina, Sclapani, and Mazzara; and the vitriolic at Palermo, Corleone, Gianissileri, Petralia, Gratteri, and Bissuna."

Those who are desirous of becoming better acquainted with the geology and mineralogy of Sicily may consult, probably with advantage, the following works, which I have not as yet had an opportunity of meeting with: —

Borch. Mineralogia Siciliana. 1780. — Descrizione fisica e Mineralogica della Sicilia e delle Isole che le sono intorno, del Sign. Prof. Abate Francesco Ferrara, Messina. 1810.— And, by the same author, Mineralogia della Sicilia. Catania, 1813. — Descrizione dell' Etna, con la storia della Eruzione, ed il Catalogo dei Prodotti. Palermo, 1818. — Also, by Sign. Agat. Recupero. Storia Naturale e Generale dell' Etna. Vol. 2. 1814. Con rami.

Of all the European islands, Sicily produces the most favoured and lovely Flora. It possesses plants which are common to Italy, Illyria, Dalmatia, the south of France, Corsica, Sardinia, the Balearic Isles, Spain, Portugal, Madeira, the north of Africa, Palestine, Syria, Turkey, Tartarian Caucasus, Greece, the islands of the Archipelago, and the Ionian Isles; many, also, that are natives of Britain, and some of the still more northern countries of Europe.

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* According to Dr. Daubeny, this limestone contains near 14 per cent. of bituminous matter.

To those who wish to learn the geographical localities of many species about the coasts of the Mediterranean, I would recommend the perusal of a very interesting paper in the *Mémoires du Muséum d' Histoire Naturelle*, tom. 14. 1827, entitled, "Enumeratio Plantarum quas in Insulis Balearibus collegit (anno 1824) I. Cambessedes, earumque circa mare Mediterraneum distributio Geographica."

Dr. Presl, who has lately published the first volume of his able *Flòra Sícula*, arranged according to the natural orders, divides the vegetation of Sicily into the *seven* following regions: —

1. The *Subtropical Region*, having an altitude from 0—100 Parisian feet, includes the cultivated exotics from the Brazils, Cape of Good Hope, &c., as Erythrìna Corallodéndron, *Phœ̀nix* dactylífera; some Mesembryánthema, *Cácti*, Mimòsæ, *Acàciæ*, &c.

2. The *Hilly Region*, which commences also with the former, and extends as high as 2000 ft.

3. The *Lower Woody Region*, or *Region* of the *Oak* and *Chestnut*, with an elevation from 2000 to 4000 ft.

4. The *Higher Woody Region*, or *Region* of the *Beech* and *Pine*, having a height from 4000 to 6000 ft.

5. The *Subalpine Region*, extending in altitude from 6000 to 7,500 ft.

6. The *Alpine Region* is elevated from 7,500 to 9000 ft.

7. The *Region* of *Lichens*, extends from 9000 to 9,200 ft., or as high as the Casa Inglese. The *three* last divisions are only to be found on Mount Etna.

It may not be improper to give the heights of some of the Sicilian mountains above the sea, according to Capt. Smyth, most of them being celebrated localities for plants: —

	Feet
Summit of Mount Etna -	10,874
Foot of the Cone -	9,760
Casa Inglese - -	9,592
Philosopher's Tower -	9,467
Highest part of the Woody Region - -	6,279
The Goat's Cave -	5,362
Convent of St. Niccolo dell' Arena - -	2,449
Lingua Grossa - -	1,725
Caltabellata, highest Peak of the Range -	3690
Monte Cuccio, near Palermo	3229
Mount Scuderi, Neptunian Range - -	3190
Dinnamare over Messina	3112

	Feet
Mount Vennerata, near Taormina - -	2925
Mount Rosso, near Buscemi	2791
Toretta Peak, Vale of Palermo	2748
Mount Griffone, near Palermo	2679
Mount Calogero, near Termini	2671
Castellaccio, a ruin above Monreale - -	2481
Monte Lauro, near Buccheri	2404
Mount Bonifacio, near Alcamo	2213
Meraglia Peak, near Palermo	2145
Mount St. Julian, the former Eryx - -	2184
Mount St. Severo, near Caronia - -	2071
Mount Pellegrino, Telegraph	1955
Capo di Gallo, near Palermo	1692

	Feet
St. Martino, Convent -	1659
Mola Village, above Taormina	1585
Highest of the Gibel manna hills - -	1519
Moorish Castle at Taormina	1305
Citadel of Cocalus at Girgenti	1240
Parco monastery -	1115
Mount Calogero at Sciacca	1035
Ancient Theatre at Taormina	847
Bocca di Falco, near Palermo	430

The principal vegetable exports from Sicily are

Almonds
Barilla
Brandy
Canary seed
Capers
Caroub pods
Chestnuts
Citrons
Cork
Cotton
Figs
Flax
Fruit
Hemp
Lemons
Lemon juice
Limes
Linseed
Linseed oil
Liquorice
Lupines
Maccároni
Madder roots
Manna
Oil
Olives
Oranges
Pistachio nuts
Pulse
Raisins
Rice
Soda
Squills
Sumach
Timber
Tobacco
Wheat
Wines

The soil of Sicily is for the most part remarkably rich and fertile, and consists of a great variety of earths, and is often of great depth: but agriculture is unfortunately in a very primitive state, and, therefore, it is difficult to conjecture what the produce might be, if a good system were enforced. At present, "the usual process," as Capt. Smyth observes (p. 11, 12.), "after clearing away the stones from the ground, is, to commence with sowing wheat, of which the best kinds are the Farro (*Tríticum Spélta*), and the Majorca (*Tríticum* hybérnum). The crop of wheat is succeeded by hemp, maize, lentils, or other pulse; and, in the ensuing seasons, generally by barley and beans, followed by mixed esculents and a fallow. The harvest begins in the latter end of June *, and continues through July and August; nor are there two successive crops of any one thing in the year, except what are forced in such grounds as are artificially irrigated, called *Ortaggi*. Indeed, in many parts, from the scarcity of manure, the peasants are reduced to the necessity of leaving their fields fallow every other season. It is customary to sow a salm of wheat (20 Eng. bushels) on a salm of land (5⅛ Eng. acres), but the quantity of seed is lessened in proportion as the soil is more fertile. The usual produce is from 10 to 16 salms, and, in the most favourable years, 28 for 1; but no part of Sicily can pretend to the once boasted hundred fold, which I am inclined to receive as a poetical metaphor."

I am, Sir, yours, &c.

JOHN HOGG.

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* J. H. arrived in Catania, May 25. 1826; some wheat had then been cut, and most of it was ripe: but when he had reached Palermo, June 10., the whole of the corn harvest was nearly finished.

Art. III. *On the Falls of Niagara, and on the Physical Structure of the adjacent Country.* By Mr. Robert Bakewell, Jun.

Sir,

During a visit of six days which my son made to the Falls of Niagara, the last summer, among other sketches of the scenery, he drew a few pictorial maps, chiefly with the intent of explaining to me the structure of the adjacent country, and the stations he had visited. These maps, with the annexed description, gave me a much more definite idea of this extraordinary place than any accounts I had previously perused; and I recommended him to transmit them for insertion in the Magazine of Natural History. The subject possesses peculiar interest at the present time, from its connection with the enquiry actively going on in this country, respecting the extent of atmospheric agency, and that of rivers and torrents, in modifying the surface of the globe. It may be proper to remark, that a strict regard to proportions has been dispensed with in the pictorial maps, in order to present all the leading features of each place in one view. In a note subjoined at the end, I have given a brief account of the rock specimens my son brought from Niagara.

I am, Sir, yours, &c.
Robert Bakewell, Sen.

Hampstead, Jan. 4. 1830.

On arriving at Buffalo, a small town near the northern extremity of Lake Erie, I was informed, by several travellers from Niagara, that the best station for remaining a few days, and viewing the Falls, was on the Canada side of the river. I therefore took the first conveyance which presented itself, and, in company with an American gentleman who had travelled with me from New Orleans, set off in joyous expectation of seeing, in a few hours, one of the most sublime scenes known on this side the world. About five miles from Buffalo, we came to the ferry at the Black Rock, and crossed over the river Niagara, which connects Lake Erie with Lake Ontario. Here we saw a number of Indians fishing, with considerable success, with the rod and line. The breadth of the river is about a quarter of a mile, and the stream very rapid. The boat was worked across by a horse, walking on a circular inclined plane, which turned two wheels fixed on each side of the boat. A coach was in readiness at Waterloo to take us to the Falls: the distance is about 15 miles. The surface of the country was flat and uninteresting, and gave little indication of the scene we were fast approaching. We watched, with

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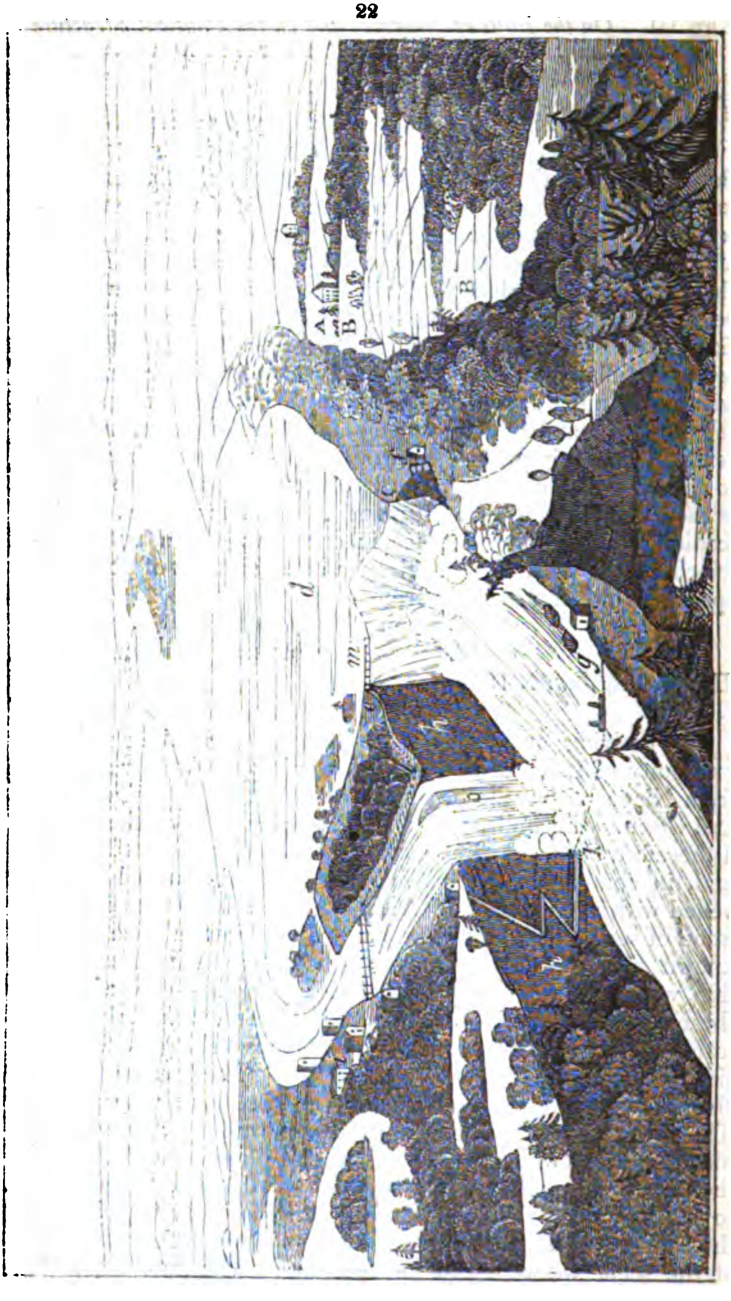

the most intense curiosity, every turn and opening in the road (which continues close to the river side all the way), to catch a glimpse of any thing which might serve to convince us of our drawing near to the object of our journey. As we advanced, the river became broader, and is divided by islands, one of which is six miles in length. When within eight miles of the Falls, a mist was observed to be rising from the river, and a deep dead sound was faintly heard; but still the face of the country appeared unchanged. No rocks rose in the distance, to mark the rude convulsions of Nature, which the imagination had conjured up as forming portals to the cataracts of Niagara. The noise, on approaching, gradually increased; the mist rose in dense volumes, and formed clouds in the air. Through the openings in the wood, we soon came in sight of the rapids, and the verge of the precipice over which the waters rush.

It will be seen, by a reference to the map, that the road from Waterloo runs by the Canada side of the river, and is nearly on a level with Lake Erie: it brings you to the back of the Falls, and, therefore, not a glimpse of them is any where visible until you reach the cataract itself.

Immediately after our arrival at the hotel (*fig.* 1. A), we proceeded to what is called the Table Rock, over which the mighty flood pours down. From the inn there is a gradual descent to a very steep bank of red alluvial sand, about 140 feet high, which caps the limestone rock. This bank (*b*) is thickly and beautifully wooded with oaks, sycamores, pines, and other forest trees. Having descended it, we walked over planks laid down on the marshy ground, to the extent of 200 yards, which brought us to the brink of a precipice (c), where the whole scene bursts at once on the sight. We were here on a level with the river, immediately before it rushes down the dreadful abyss. The loud, solemn, all-pervading roar of the waters is indescribably awful. The great commotion of waters at the base is concealed by thick clouds of mist, which, on ascending to a certain height, are borne away by the winds. The water, from violent agitation, is perfectly white for some distance below the Falls, and tilts up and down like a little sea, producing a thick cream-coloured foam, which is seen floating down the stream in large beds. The sublimity of the scene cannot be exceeded. We find ourselves suddenly in the presence of a superior power, and feel an impressive consciousness of our own nothingness. This Fall (from its concave form called the Horse-shoe Fall) is 600 yards wide, and 158 feet perpendicular. The descent of the rapids immediately above the Falls (*d*) is 58 feet, making the whole 216 feet.

Goats' Island (*e*), which divides the American and Canada Falls, presents a bare face of perpendicular rock (*h*), which extends about 500 yards north and south. The American Falls are about 200 yards in width, and 164 feet in height.

At a short distance from the Table Rock, a wooden spiral staircase is erected, of which the top is represented at *f*. The staircase we descended, and approached as near as we could to the bottom of the Fall, without getting wet through. The noise here was sublime, but not so loud as I had expected. Owing to the rising spray, only a part of the cataract was visible: huge fragments of rocks, which had been torn asunder from their native bed by the torrent, lay as 'monuments to record the mischief it has done,' and formed, with the overhanging precipice, a bold and savage foreground to chaos beyond.

As my companion was returning to Buffalo for New York that afternoon, we hastened back to the hotel (called the Pavilion), which is a spacious building of wood, situated on a rising ground very near to the Falls: it is kept by Mr. Forsyth. His son has another hotel not far off.

In consequence of the coldness of the season, there were very few visitors; about twenty sat down to dinner. Mr. Forsyth, the landlord, was at the head of the table, and related the wonders of the place. He had lived there forty years, and was the first settler in that part of the country, during which time, he informed us, that the Falls had receded from 40 to 50 yards. Not many months ago, an immense portion of rock fell down, which caused a considerable change in the appearance of the Falls, and gave quite a new and beautiful feature to the scene. On the falling in of this rock, the water immediately above met with an obstruction, and, instead of shooting over in a curved line, from the top to the bottom, appears to boil out in globes, enlarging as they descend, and may be compared to a sudden burst of steam, perfectly white, which contrasts finely with the transparent, delicate, green colouring of the body of water that rushes by its side. The torrent, seen *en profile*, as it rushes over the precipice, is here estimated to be about 12 or 15 feet *thick*. I make use of this term, to distinguish it from breadth and depth. It does not preserve the same thickness in every part, but varies considerably in this respect. The only perceptible variation observed during the year, in the quantity of water which flows down the Falls, is when a strong south-west wind sweeps over the wide expanse of Lake Eric, driving its waters into the mouth of the river.

It was my intention to have taken a series of views, anticipating much pleasure from looking at them when some thousand miles distant, but, for the first day or two, I felt so dispirited with the magnitude and grandeur of the subject, that I had nearly given up the attempt. As my mind became more familiar with the objects around me, I gained courage, and rambled about in search of situations from which the best general view of the scene might be taken. The grandest point of view is, perhaps, at the foot of the limestone rock on the Canada side, about 100 yards from the bottom of the staircase, the top of which is seen (*fig.* 22. *f*); but the subject is too vast for the pencil. The wind, the state of the atmosphere, the time of the day, &c., produce most wonderful changes on the scene, and on the mind; the transitions of sunshine and shade are the most remarkable. One afternoon, whilst standing on the Table Rock (*c*), contemplating the scene before me, never shall I forget the effect of the sun's rays, darting from beneath a dark cloud, when within 15° of the western horizon. This sudden burst of golden light flashing on the picture, spread an ethereal charm that was quite enchanting. I could scarcely believe that I was gazing on the same objects. How exquisitely beautiful was the iris* which, in an instant, started into being, and encircled this sublime scene with its loveliness and splendour! The varied but subdued tints of vegetation, the evanescent and floating appearance of the grey-tinted rocks on the opposite side, as seen through the thin veil of mist, the deep long-drawn shadows from the setting sun, and the hollow sound of that mysterious voice that thundered from the gulf, gave a spirituality to the whole which it is impossible to describe.

Early one morning, I went with the guide to pass under the water of the Canada Fall: we took off our clothes at a hut built at the bottom of the staircase, and equipped ourselves with strong shoes, large loose cloaks, and strong, broad-brimmed, white painted hats. We had not proceeded far over the loose slippery stones, before the guide stopped to wash his head at a sulphur spring, which came down in big drops: what its virtues were I did not enquire. On turning a sharp angle of the rock, a sudden gust of wind met us, coming from the hollow between the Falls and the rock, which drove the spray directly in our faces, with such force that, in an instant, we were wet through. When in the midst of this shower-bath, the shock took away my breath; I turned back, and scrambled over the loose stones, to escape the conflict. The guide soon followed, and told me that I had passed the worst part. With that assurance, I made a second attempt; but so wild and disordered was my imagination with the novelty of my situation, that, when I had reached half way, I could bear it no longer, and hurried out much faster than I entered, having taken but a hasty glance of the great sheet of water over my head. From the base of the rock to the falling water, there is a space of about one hundred feet.

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* It was not a segment of prismatic colours, like a rainbow, but an entire circle.

The ferry (*g*) is rather more than a quarter of a mile from the Falls, in a straight line. Following the serpentine direction along the verge of the cliff (*b*), the walk is very interesting, from the views, seen through the openings of the trees, of what are called the American Falls, and of the perpendicular rock (*h*) which forms one of the sides of this deep natural channel. The small town of Manchester (*i*), situated about half a mile from the Falls, and several large mills, give a cheerful appearance to this part of the picture. A broad steep path conducts from the edge of the precipice to the ferry. Such is the comparative tranquillity of the water in this part of the stream, that I was taken across by a boy, to the landing-place on the other side (*k*), immediately below the American Falls. The waters which expand to form the American and Canada Falls, after uniting, are here contracted into a stream not more than 160 yards broad. The river is confined between perpendicular rocks; and the quantity of water that falls is estimated to be 100,000,000 tons in an hour: hence, it might be thought that the current, for miles, would be impassable for a small boat in this narrow channel. It seems almost incredible, were not the fact decisively proved, that, immediately below such an immense rush of waters, the surface should be sufficiently tranquil to allow a boat to pass across the stream with so much ease; but, what is still more extraordinary, there is a current of back water on the American side of the river, running *towards* the main fall. The explanation given by persons residing on the spot is, that the depth of the river exceeds 170 feet, and that the water from the Falls sinks beneath, and forms an under-current, which, in its progress, dashing against the rocks at the bottom, causes the water to rise, in different parts, in circular heaps to the surface, and forms the back current. Having crossed the river several times, I feel convinced that this explanation is correct: indeed, so comparatively tranquil is the creamy surface, that boats often advance *to the very base of the Falls.*

On ascending a zigzag staircase up the rocks, I arrived at the ferryman's hut, and followed the path to the rapids above the American Falls, over which there is a wooden bridge, of curious construction, supported by the projecting rocks. These rapids, alone, would be visited by thousands in any other situation. The descent is about 60 feet in half a mile. On crossing the bridge, for which I paid 25 *c.*, I came to the Enchanted Island, commonly called Goats' Island (*e*). Several females were gathering wild raspberries, of which there was great abundance. As I was rambling through this delightful spot, I observed, at a short distance, a tall figure, in a long dark-coloured cloak, with an old broad-brimmed hat, a folio book under his arm, and a staff or wand in his hand, walking majestically towards me. I felt a kind of awe on approaching this singular-looking character, who appeared the Genius of the place, the *Prospero* of the island. When I came up with him, he gave me a mysterious look, and passed. To follow up the fiction of the Enchanted Island, a *Miranda* was not wanting, for I had seen her gathering fruit; and, as for *Caliban*, he was, no doubt, growling mischief under the Falls.

Following the course of the stream, from the bridge to the Falls, I came to a very retired nook or spot of ground (*l*), where not more than two or three persons could safely stand without the fear of being elbowed down the cataract. Seated on the root of a tree, under a natural arbour which overhung the abyss, I surveyed, with mingled feelings of admiration and awe, the beauty and grandeur of the scene beneath me. It was a most lovely day: sunshine and cloud, by turns, swept over the face of Nature; the effect was heightened by the magical appearance of the inconstant rainbow. This was the segment of a circle, and not a circular iris like that before mentioned. A ledge of rock (*o*) divides the water into two unequal falls. These Falls are higher than the Horse-shoe Falls, and, being much narrower, they appear still more so. The breadth of the island is about 500 yards from this point to the Canada Falls, on approaching which, I came unexpectedly upon an open piece of ground that commands a fine view of the rapids (*d*), whose turbulent career commences half a mile from the Fall. The distant horizon to the south is bounded by forests. On the opposite woody banks were seen the two hotels, and, to the north, the beautiful avenue of rocks, clothed with vegetation, through which the river escapes.

A railed platform (*m*) has been constructed on the rocks, extending over the water from the island, to the commencement of the curve which forms the concave central part of the Horse-shoe. The whole Canada Fall may be said to form three curves: the two sides are small, being slightly convex; the centre concave, with the edge much broken. The station

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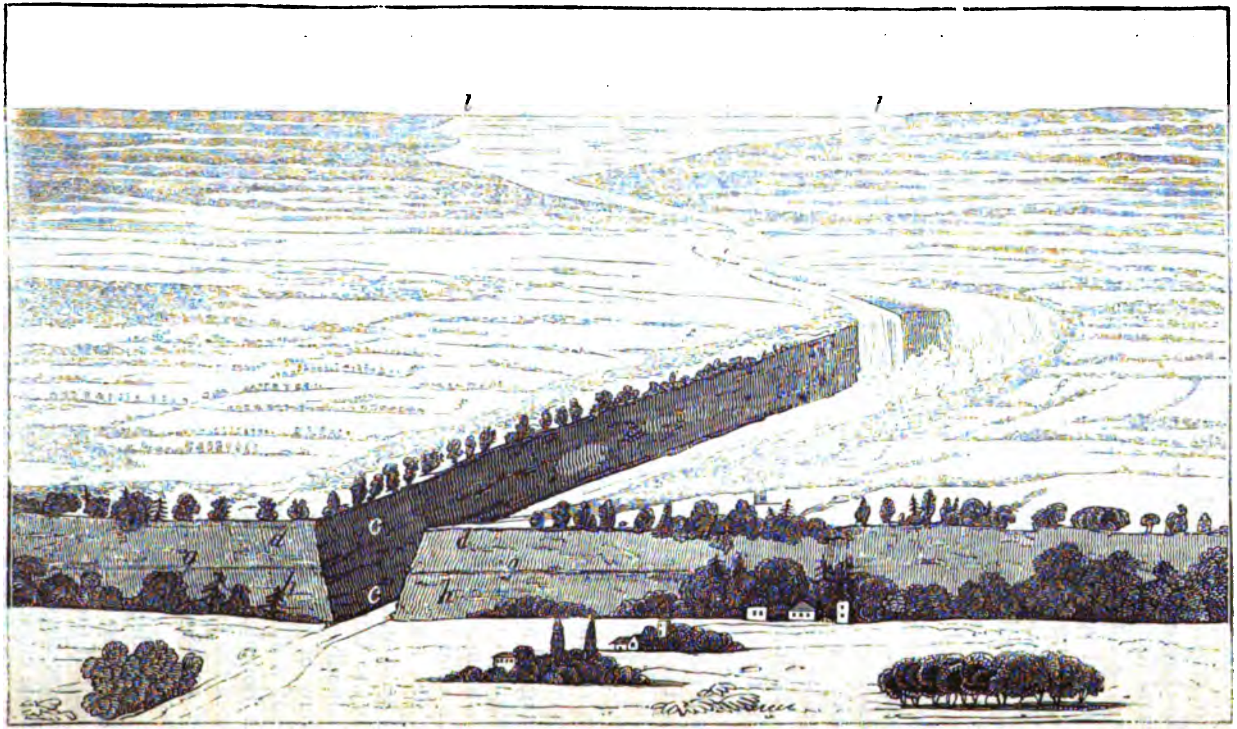


at the end of the platform is inconceivably grand, suspended, as it were, over the yawning gulf; distance is concealed by thick volumes of mist, and the imagination is left to fathom the deep descent. I felt an indescribable sensation stealing over me, which made it dangerous to indulge any longer in hanging over this irresistible tide.

It is curious to watch the vapour as it sometimes hangs suspended: when it arrives at a certain height in the atmosphere, many of its curves will break, assume a ragged hanging appearance, and then dissipate into air.

On my return through the island, I again saw the mysterious visiter, seated at the foot of a tree, with his folio laid open on his knees: he did not deign to look at me on passing, so intent appeared he at his studies. The only history I could hear of him was, that he had lived several years at Manchester, that he was insane, but harmless, and spent a great portion of his time on the island. I lingered until evening in this beautiful seclusion, and returned to the hotel, having passed one of the most delightful days of my life.

During a week's residence at the Falls, I was greatly surprised, on returning to the hotel, after each day's ramble, to find so few of the visiters, from different parts of the world, that I had left in the morning: numbers would come and go the same day, others would spend one or two days, but seldom any stayed over the third; yet they all came for the express purpose of seeing the Falls of Niagara.

Proceeding northward from the Falls of Niagara, the road continues for seven miles on the same table land, which is nearly on a level with Lake Erie (see *fig.* 23.), when the country suddenly sinks down to a plain, spreading to the shores of Lake Ontario. Descending to this plain, I came to the small village of Queenstown, situated near the banks of the river, where I was agreeably surprised on seeing the abrupt termination of the opening or channel through which the river flows, after its descent at Niagara, as represented in the birdseye view. (*fig.* 23.)

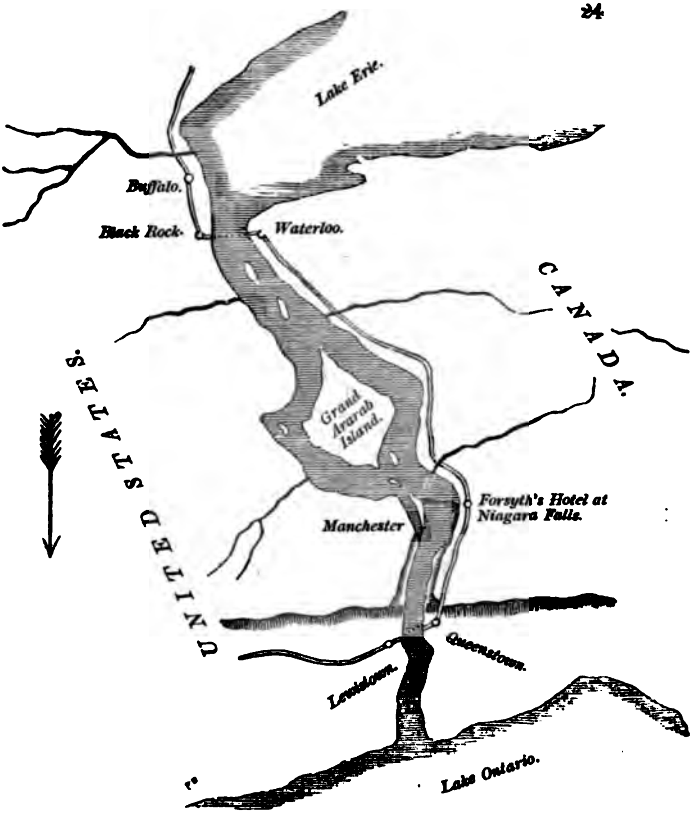
It is very remarkable that the river does not enlarge on escaping its narrow bounds, being only 160 yards wide, and continuing so, with little variation, until it is lost in Lake Ontario. The current is very rapid, compared with what it is immediately below the Falls. The ferryman, in crossing with his boat, was obliged to ascend a considerable distance by the bank side, and then glide down the current towards the opposite side of the river. The waters of the Lakes Superior, Michigan, Huron, and Erie all pass through this channel, which gives a peculiar interest to the place, when taken in connection with the appearance of the chasm from whence the waters issue. The height of the chasm (*fig.* 23. *c c*) in the solid rock, independent of the receding diluvial soil, is about 200 feet to the plain; its width at the opening (*d d*) is, perhaps, 400 yards. On viewing this highly interesting scene, the mind is irresistibly carried back to the time when a mighty flood poured over the *once*-united precipice at *d*. This fact, I think, cannot be doubted by any one who sees its present appearance, and who duly reflects on what a falling body of water, so immense, so rapid, and so resistless in its course as the river of Niagara, is capable of accomplishing in a series of ages. Taking it for granted that the Falls have once been at *c*, it is a curious question to enquire, When were they there? An approximate solution to this enquiry will be given, if Mr. Forsyth's statement be allowed of the Falls having receded nearly 50 yards in the last 40 years, and if it be granted that this has been the constant ratio of their recession. The distance from the opening (*c*) to the Falls is 7 miles, equal to 12,520 yards, which gives 9856 years for the period in which they have been retrograding to where they now are. It appears evident, from circumstances to be hereafter stated, that the waters were formerly more abundant than they are at present; nor can we be certain that the rocks were equally hard in every part of their extent, in which case, the process of disintegration would be much quicker, and the period of recession shorter.

The drawing (*fig.* 23.) is intended to represent a birdseye view or map of the country, from an imaginary point above the chasm at Queenstown, and to comprise a view of the river as far as Lake Erie (*l l*). The distance, as I have before mentioned, from Lake Erie to the Falls is 25 miles, and from the Falls to the opening (*c*) 7 miles. The waving lines (*f f*) mark the alluvial or diluvial sand cliffs above the limestone precipices (*d*). This diluvium covers a great part of the table land. The lines *g g* mark the separation between the limestone and the lower shale (*h h*). It may be proper to observe, that these lines are more distinctly represented than what are seen in nature, the rocks (*h*) having banks thickly wooded up their sides, and the edges of the precipice are here and there broken.

It is evident, from the curved and water-worn appearance of the diluvial banks (*f f*), in which large boulders are embedded, that the waters must once have flowed nearly on a level with these banks. This important consideration again carries us back to the period of time when the chasm (*c*) did not exist, when the parts *d d* and *h h* formed but one and the same rock, and when the extensive waste of waters poured over the precipice at Queenstown, before they had worn out the channel (*c*) in the solid rock.

Before adverting to the causes which have combined to effect the excavation of the chasm (*c*), 7 miles in length and 200 feet in depth, it may be proper to say something of the strata which form the table land, and in which the excavation is made. The diluvial sand varies in thickness from 10 to 140 feet; under this is a bed of hard limestone, containing a few imperfect organic remains: this stratum is about 90 feet in thickness, it extends nearly in a horizontal direction over the country, and forms the bed of the river above the Falls. This limestone rests on a bed of loose shale rock (*h*), nearly of the same thickness: it is exceedingly fragile, and crumbles into small pieces on being removed from its native bed; the shale, also, contains some pieces of dark argillaceous limestone. Had all the strata been solid limestone, there is great reason to believe that the erosive action of the water would have been very slow, and many generations might have passed away without any sensible change taking place; but the vast mass of waters, breaking, with inconceivable force, on the softer shale which forms the base of the hard rock, the foundation is thus undermined, and the harder rock breaks down, in considerable masses, for want of support.

It is highly probable that the Lakes Superior, Michigan, Huron, and Erie were once united, and formed one vast inland sea, which poured its waters down the Missouri and Mississippi into the ocean; even at present, some of the branches of the former river (in high floods) interlock with the rivers that run into Lake Superior. The abrupt termination of the table land at Queenstown (see *fig.* 23. and *fig.* 24.) would indicate a subsidence of the country round what is now Lake Ontario: such a subsidence, if admitted, would very naturally explain the circumstances at present existing. The waters of the great lakes to the west would, at first, rush over the whole precipice at Queenstown, and take a northern direction by the river St. Lawrence. As the waters gradually became lower, they would be confined between the diluvial banks (*ff*), and finally begin to furrow the passage or chasm in the solid rock which we at present observe. The immense force of the water, as before stated, acting on the loose shale, it would be carried away in the state of mud, and the overhanging limestone, being left without support, would fall down in large masses, which would be broken by the fall, and would be worn and carried away by the violence of the current. This pro-



cess, being constantly in operation, the Falls have, crab-like, travelled to their present situation.

A cursory glance at what is now taking place at the Falls, leaves not a doubt that the great cause of the comparatively quick retrograde movement of the Falls is, the loose and soft material on which the limestone rock rests, and the destructive action of the water upon it. The water, also, penetrating the crevices between the strata of solid limestone, detaches them from each other, and disposes them to fall. At present, the limestone rock projects considerably over the shale at the Falls, and it is this projection which makes it practicable to pass between the water and the rock, nearly half way under the Horse-shoe Fall.

A few months before I was at Niagara, a very extensive portion of rock, as before mentioned, fell down at the Horse-shoe Fall. The shock was felt at a considerable distance: the noise was like a distant clap of thunder.

The disintegration of the rocks must continue until the Falls reach Lake Erie, provided the present causes continue to operate. Goats' Island, which now separates the Falls, will, perhaps, as the waters recede on each side of it, remain in the midst of the fallen flood, a high, perpendicular, inaccessible rock: a lasting monument of the destructive power of that element which now thunders at its base.

It may, perhaps, be said that this deep chasm or channel, through which the river runs on its descent, was a rent made by an earthquake. This supposition would avail if the strata were deranged, but the reverse is the fact. The strata on each side are parallel and on the same level, and bear evident marks of the action of some powerful instrument having cut through them in a perpendicular direction: that instrument was water. The wall-like appearance of the rocks on each side of the river is precisely the same at the Falls, as at the commencement of the chasm at Queenstown.

By the lockages on the Erie and Oswego canals, lately constructed, it appears that the elevation of Lake Erie above Lake Ontario is 290 feet; and that the elevation of the former lake above the river Hudson, at Albany, is 575 feet. The river at Albany is 150 miles distant from the sea.

Since it is a well established fact that the Falls have receded considerably within the memory of man, and are, by slow but progressive steps, cutting their way backwards to Lake Erie, the mind is led to anticipate the period when the present chasm will extend to that lake, and the consequences which must result from such an event.

My father, in a former edition of his *Introduction to Geology*, published in 1815, offered some observations upon this subject, the justice of which seems confirmed, in a remarkable manner, by the recent interesting researches of Mr. Lyell, on the fresh-water formations in the lakes of Scotland: — "Since the banks of the Cataract of Niagara were inhabited by Europeans, the distance has been progressively shortening between the Falls and Lake Erie. When it has worn down the intervening calcareous rocks, and effected a junction, the upper lake will become dry land, and form an extensive plain, surrounded by rising ground, and watered by a river or smaller lake, which will occupy the lowest part. In this plain, future geologists may trace successive strata of fresh-water formation, covering the subjacent crystalline limestone. The gradual deposition of minute earthy particles, or the more rapid subsidence of mud from sudden inundations, will form different distinct beds, in which will be found remains of fresh-water fish, of vegetables, and of quadrupeds. Large animals are frequently borne along by the rapidity of the current, and precipitated down the cataracts: their broken bones, mixed with the calcareous sediment, may form rocks of calcareous tufa, where the waters first subside after their descent."

It may be proper to remark, that the partial drainage of Lake Erie will also effect a corresponding drainage of the other lakes connected with it, and add many thousand square miles of productive soil to the continent of North America. *

ART. IV. *Dates of the first and last Appearances of the* Hirúndines *in the Neighbourhood of Allesley Rectory, for the Year* 1829, *with Remarks.* By the Rev. W. T. BREE, M.A.

Sir,

YOUR correspondent, L. E. O. of Bradford (Vol. II. p. 458.), communicates the interesting fact of his having observed the common swallows (he does not state the number of them), on the 15th of November, at Richmond in Yorkshire. This is certainly late in the season for these birds to be seen; later, indeed, than I have ever observed them, except in one instance, which was on November 20th, as appears by referring to the table of arrivals and departures (Vol. II. p. 19.) under the year 1806; and in this instance it was only a single bird that was seen.

Your correspondent is pleased to say that "it was his intention to have communicated this previously to the present time, in the form of an essay on the arrival and departure of the *H*irúndines, along with *some other observations and facts* which he has collated [collected?], but that I have anticipated him."

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* The few rock specimens my son brought from the vicinity of Niagara are: —

1. A hard subcrystalline grey limestone.
2. A dark very close-grained limestone. Both the specimens closely resemble some of the lower beds of English mountain or transition limestone.
3. The same dark limestone, with an indistinct vestige of chain coral, in which the organic part is chert. In this specimen there is a small string of yellow blende (sulphuret of zinc). The above three specimens are from the hard limestone (*d d*) in *fig.* 23.
4. A dark argillaceous limestone, from the shale *h h*.

Though there are few organic remains in the limestone at the Falls, the mineral characters indicate that it belongs to the transition class of rocks. — *R. B., Sen.*

As these facts, &c., collected by an accurate observer, cannot be without interest, and may in all probability throw some additional light on a subject by no means fully cleared up, I sincerely hope L. E. O. may still be induced to communicate them, together with his remarks, through the medium of your Magazine. "Two heads are," proverbially, "better than one;" and "Natural History ought to be studied as a *collection of facts*, not as the history of our guesses or opinions." *

I take this opportunity of mentioning the date of the first and last appearances of our *H*irúndines for the present year (1829), in order that such of your readers as think it worth while, may be able to fill up the blank space unavoidably left in the table above alluded to, which was printed in March last.

	First seen.	Last seen.
Swallow	April 17.	October 14.
Marten	April 23.	October 14.
Sand Marten	April 29.	
Swift	May 3.	August 3.

The swifts were mostly gone in this neighbourhood by the end of July; perhaps the wet ungenial season hastened their departure. The swallows too, and martens, i. e. the main body of them, retired early. Having paid more than usual attention to the departure of these interesting birds this autumn, I may, perhaps, be pardoned for stating the particulars more in detail. The swallows and martens, then, had become scarce with us by the end of September: I observed a few of both species, October 3d; and a few swallows only, on the 4th and 6th; both species again on the 8th; and on the 9th we had a large assemblage of swallows soaring and sporting in the middle of the day about the church and over the village, apparently enjoying themselves as in the height of summer; but I cannot positively say that there were any martens among them, though I suspect there might have been. This flight, I have little doubt, consisted of the later-hatched broods; and the young swallows, before their tail feathers are fully developed, when flying high in the air, are not always readily to be distinguished from their congeners. Not one individual could I see on the 10th, though a much warmer day than the preceding. Many appeared again on the 11th, when the day was also warm, and three swallows on the 12th. The 14th was very wet and stormy, but cleared up towards the evening, when I observed four or five swallows and two martens. From this day they retired to terra incognita, and I could see them no more. I have to apologise for being thus tediously minute. If the above remarks do not serve in any degree to clear up the difficulties in which the subject is involved, they show at least how these amusing little creatures baffle our researches and enquiries; for it is difficult to account for the fact of swallows being to be seen here in plenty on the 9th and 11th of October, while not one was to be observed on the 10th, though the weather was fine and warm. What had become of them on this intermediate day, the 10th? Perhaps L. E. O. may be able to elucidate the point. At all events, he will oblige a brother swallow-fancier, by communicating any observations he may have to make on the subject. Yours, &c.

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* See note, by Forster, in *Kalm's Travels*, vol. ii. p. 9., second edition, where the reader will find some curious statements in proof of the position, that swallows, in northern countries at least, retire under water for the winter, and have actually been found in such situations in a torpid state!

Allesley Rectory, Nov. 23. 1829. W. T. Bree.

P. S. — Since writing the above, I have been informed by a friend, on whose accuracy I can fully depend, that a single swallow (*H.* rústica) was observed flying about the mansion at Packington, six or seven miles hence, on the 6th of November.

Art. V. *Some Account of the British Pearl Fishery now existing on the Conway.* By D. C.

Sir,

As it may not be generally known that a pearl fishery exists at the present time in any part of Great Britain, I am induced to send you the following particulars for the gratification of your numerous readers: —

The pearl muscle (*Mỳa* margaritífera) is found in abundance in the River Conway, in North Wales, and is collected by many of the natives, who obtain their livelihood entirely by their industry in procuring the pearls. When the tide is out, they go in several boats to the bar at the mouth of the river, with their sacks, and gather as many shells as they can before the return of tide. The muscles are then put in a large kettle over a fire to be opened; and the fish taken out singly from the shells with the fingers, and put into a tub, into which one of the fishers goes bare-footed, and stamps upon them, until they are reduced into a sort of pulp. They next pour in water to separate the fishy substance, which they call *solach*, from the more heavy parts consisting of sand, small pebbles, and the pearls, which settle in the bottom. After numerous washings, until the fishy part is entirely removed, the sediment, if I may so term it, is put out to dry, and each pearl separated on a large wooden platter, one at a time, with a feather; and when a sufficient quantity is obtained, they are taken to the overseer, who pays the fisher so much per ounce for them. The price varies from 1*s.* 6*d.* to 4*s.*; there are a number of persons who live by this alone; and where there is a small family to gather the shells and pick out the fish, it is preferable to any other daily labour. The pearls are generally a dirty white, sometimes blue, but never, I believe, green or reddish. I have sent you a few specimens (*fig.* 25.), and I leave you to describe them. I cannot with accuracy say how many ounces are taken to the overseer each week, though I might say that there are some scores. But what makes this fishery the more singular is the mystery which hangs over it. At present it is a perfect monopoly, and there is but the one who buys them up that knows what becomes of them afterwards. It has been carried on in this manner for many years; and as such a thing, if made public, might prove more beneficial to the neighbouring poor, by causing a higher price to be given for the pearls, through competition, it would be very desirable if any of your numerous correspondents could throw some light on this interesting subject. There have been some curious and fanciful surmises, which may not be thought worth mentioning. Some suppose that the pearls are sent abroad to be manufactured into seed pearls: others, more *gravely*, that they are exported to India to be dissolved in the sherbet of the Nabobs!! However, at present it is a mystery; and notwithstanding the pains taken and the expense incurred by some liberal gentlemen in endeavouring to find out the secret, it is as great a mystery as ever. The huts which have been erected for the convenience of boiling the fish, are on the extremity of the marsh, about a mile north of the town of Conway. The pearls are seldom found here much larger than the enclosed specimens, though about twelve miles up the river, they have been found occasionally as large as a moderate-sized pea, and have been sold for a guinea the couple, but they are very rarely met with. When I say that the price varies from 1*s.* 6*d.* to 4*s.*, I do not mean to say that they are valued according to their size, for the large and small pearls are all sold together; but some years ago they were as high as 4*s.*, now they are only 2*s.* per ounce. Yours, &c.

Nov. 27. 1829. D. C.

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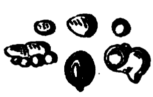

The sample of pearls that accompanied this letter contained three black ones; the rest, hardly worthy of the name of pearls, have no lustre, and are duller than those found in the common English oyster, and very irregular in form. They may be as good to dissolve in sherbet as any, but must be totally unfit for ornaments. Fine pearls have, however, often been found in the *Mỳa* (U'nio) margaritífera, and sold for jewellery, and such must be what the overseer purchases. — *Cond.*

Art. VI. *An Introductory View of the Linnean System of Plants.* By Miss Kent, Authoress of *Flòra Doméstica, Sylvan Sketches,* &c.

(*Continued from* p. 62.)

The class *Heptándria* (distinguished by seven stamens) is the smallest and the least important of the four-and-twenty, and contains only one British species; a plant called chickweed winter-green (Trientàlis europæ'a), but seldom met with, and possessing little interest but for the botanist, though by no means deficient in beauty. The seed is clothed in a tunic of lace, and the leaves are elegantly veined.

That magnificent and stately tree, the horsechestnut (*Æ'sculus* Hippocástanum), is a visitor from Asia, too well known to need description; yet two persons would be likely to describe it in very opposite terms: for there are few plants, great or small, about which people differ so widely; one calls it handsome and stately, another heavy and clumsy. It is certainly ornamental when in leaf, and yet more so in the bravery of its blooming thyrses; but, in its winter nakedness, it is like a clumsy living faggot, wholly destitute of grace or apparent beauty. I say apparent, for it has hidden beauties; to which, perhaps, may be attributed some portion of its clumsiness. The buds, which, at a distance, appear like so many knobby ends of a bundle of thick sticks, will amply repay a careful examination: they are of two kinds, the smaller, leaf-buds; and the larger, flower-buds. A celebrated German naturalist detached from this tree, in the winter season, a flower-bud not larger than a pea, in which he could reckon more than sixty flowers. The external covering was composed of seventeen scales, cemented together by a gummy substance, and protecting from moisture the down which formed the internal covering of the bud. Having carefully removed both the scales and down, he discovered four branch leaves surrounding a spike of flowers, and the latter so clearly visible, that, with the aid of a microscope, he not only counted sixty-eight flowers, but could discern the pollen of the stamens, and perceive that some was opaque, and some transparent. It would be more advisable for the young student to gather one of these buds in the early spring, when the sun is just beginning to melt away the gum with which the scales are sealed together. If his surprise at the fact here related have touched upon incredulity, he will then believe and admire; as he becomes more familiar with such objects, his doubt and wonder will probably be diminished, but his interest and love of nature will be proportionally increased. The examination of buds, bulbs, and seeds will afford an endless source of entertainment and admiration to the young botanist: he will be surprised to learn by how many miniature plants he has been unconsciously surrounded in the depth of winter. There are comparatively few seeds in which he may not see something of the future plant: he may witness the early promises of spring while luxuriating upon the ripe fruits of autumn. Even in imported fruits he may behold life as it were waiting to start into action: let him split an almond, and between the two sides, which are termed the *cotyledons* (cavity, from the Greek), and which are the storehouses from which the young plant draws its nourishment, he will perceive two small leaves, regularly formed and veined, and wanting only light to give them colour. Of the bulbous flowers, one of the most obvious in this embryo state is the tulip, on account of its size. Carefully stripping off the coats of the bulb one by one, the miniature plant may be discovered snugly cradled in the centre. We cannot have a better specimen of the early formation of plants in the bud, than in that of the horsechestnut. This tree was brought into England in the year 1550, and is now so common that we do not generally consider it as a foreigner: or, if we do ever think of it in that light, it is as a *flower* from Brobdignag: a fine Brobdignagian lupine; not as a stout tree stretching out its umbrageous arms over us, like a father with protecting tenderness laying his hand upon the head of his child. The deer, however, account it a noble fruit tree: they feed eagerly upon the nuts, which, either in a raw state, or made into a paste after maceration in lime-water, are frequently given to sheep to fatten them. The Turks grind them, and mingle the meal with other provender, for their horses. Both soap and starch have been obtained from these nuts, and there has been just enough done to show that there is much more to do, and that industry and ingenuity might turn them to account in various ways. They afford an excellent size for paper-hangers and book-binders, and a cephalic snuff; and the husks are employed in the tanning of leather. The wood is not particularly valuable, but the bark is sometimes used in cases of fever. It is extraordinary that the many uses which experiment has shown may be made of this tree, its easy cultivation, and remarkably quick growth, should not have excited more attention in this speculating age, and that there should not have been a Joint-stock *Alliterative* Company for the manufacture of starch, soap, size, snuff, and shoes. The tree attains its full growth in about fifteen years from the first vegetation of the nut; its operations are, indeed, remarkably active for so bulky a tree: naked, clumsy, and heavy as it looks during the winter, no sooner does the sun melt away the cement by which the scales are bound together than the tree starts immediately into leaf; and it is understood that the spring shoots complete their growth in the space of three weeks.

I have spoken at some length of this tree, my dear reader; for the class to which it belongs is so small, that were I not to linger a little over the plants which I mention, you might be likely to forget that I had spoken of the class at all. Let me observe, by the way, that there are three numbers with which botany is by no means familiar; seven, nine, and eleven.

Another well known plant of this class and order is the *Cálla* æthiópica, commonly called the arum. The fine white flower of this plant, so generally admired, is, as I have before observed, without the corolla; what is commonly taken for such being the calyx; that species of calyx botanically termed a *spatha*. The column rising in the midst of it is styled a spadix, a name given to the receptacle of the flowers of palms, and extending to very few others.

The genus Séptas, of the order *Heptagýnia*, is a remarkable instance of the prevalence of the number seven, in which, as Rousseau observes, "nature seems to take no delight." It has seven stamens, seven pistils, a calyx of seven segments, a corolla of seven petals, and seven capsules.

The eighth class, *Octándria*, comprises many genera, very different in their general aspect: in some plants you may detect the class to which they belong at a glance; but in the octandrous plants the young botanist must have recourse to the Linnean characters before he can have any notion of their place in the artificial system, several *natural* families being here united. The student would not be led, by their external appearance, to suppose that the heath, the nasturtium, and the maple tree were included in the same class and order;

yet all are *octandrous*, and all *monogynous*. Of this first order we have nine British genera, of which eight are well known, and the greater number handsome. Of the Œnothèra we have but one species Œ. biénnis (*bis*, twice, *annus*, a year), the evening primrose; and some botanists doubt whether that is really a native. Sir J. E. Smith observes that, though undoubtedly wild on the coast of Lancashire, it may have been brought by natural means from the other side of the Atlantic. It has been found in some places less suspicious, but still, it may be supposed to have escaped from gardens; being a plant in general cultivation. It has no resemblance to the primrose but in colour; its fine fragrant petals expand in the evening, and make a conspicuous figure in a bouquet, for which the flower is the better adapted as it is fragrant without being oppressive. Several foreign species are seen in gardens, some yet handsomer than this native or naturalised species.

The willow-herb is a large and beautiful genus, of which we have nine native species: it derives its English name from the form of its leaves, and the watery situations in which it is found. The botanical appellation, Epilòbium, signifies a violet on a pod*; but it must be acknowledged that the flower has very little resemblance to a violet, either in form or colour; neither is its pericarp properly termed a pod: — it is inferior, quadrangular, 1, 2, or 3 in. long, according to the species, and more or less tinged with red; it is composed of four pieces called valves which form the sides, and is divided into four cells by as many partitions extending from thence to the angles of the quadrangular receptacle, as seen magnified in *fig*. 26. *a*. (This receptacle is not to be considered as one of the seven parts of fructification; it is the receptacle, not of the flower, but of the seeds.) If the seed-vessel be carefully opened on one side, when ripe, a sort of silky feather will immediately spring out, as if weary of confinement in so narrow a lodging (*b*). Each seed is winged with these silken feathers (*c*), in which they lie embedded, until the valves make away for them to take flight, and by their means the plant is

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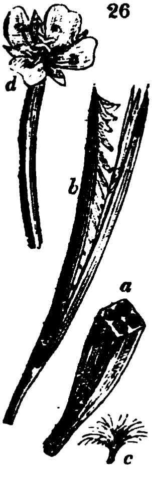

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* Some persons believe the word violet to have reference to the colour only; but one small objection to this interpretation is, that the colour is no more like that of the violet than the form: others suppose the word to be used in a complimentary sense, as we use the word pink. In France and Italy the name of violet is extended to many other flowers, more especially the stocks, wallflowers, and others of the fifteenth class.

disseminated over various parts of the country. The seed-vessel is crowned by the calyx, which is red, of one leaf, tubular at the base, with the upper part (botanically termed the limb) divided into four segments, between which are inserted the four petals, which are of a paler red. The stamens, four of which are longer than the alternate four, are affixed to the throat of the calyx (the top of the tube) between the petals: the stigma is, in some species, divided into four segments curving downwards at the extremity, and forming a cross (*d*); in others, it is obtuse and undivided. The two handsomest of our native species are E. angustifòlium (narrow-leaved), and E. hirsùtum (hairy); the latter, as commonly as the former is rarely, to be found in a wild state; the one a frequent inhabitant in shady lanes, the other generally cultivated in flower-gardens, where it spreads but too quickly; are rivals in elegance and beauty. The other species are smaller, but none are deficient in beauty.

Among the yellow flowers, many of which are seen upon every bank, and which are usually passed by as the least interesting and handsome, is one which the most accurate description could scarcely distinguish from the commonest; but which stands among them as a queen of beauty among ordinary mortals, Chlòra (green) perfoliàta (through the leaf). The species of plants are usually determined by characters not included in the fructification: this is distinguished by its leaf, which has the appearance of two egg-shaped leaves cut straight off and united at the base, allowing the stem to pass through the middle; hence the plant is termed perfoliate. (*fig.* 27. *a*) The stem is a foot or more in height, bearing a panicle of star-shaped flowers, of a clear bright yellow, with scarlet stigmas; harmonising admirably with the glaucous hue of the leaves.

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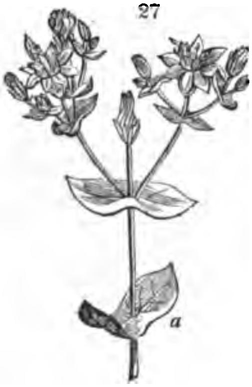

Of the *V*accínium, an extensive, and chiefly an American genus, we have four native species, well known by the young peasantry, who strip them of their berries; which they eat either with milk and sugar, or in puddings, jellies, &c. The bilberry (*V.* Myrtíllus) is a delicate little shrub with red flowers; this and the bleaberry (*V.* uliginòsum) are deciduous (shedding their leaves in winter; from the Latin, *decidere*, to fall), the other British species are evergreen. The cow-berry (*V.* *V*ìtis Idæ̀a) has a bitter fruit, which, after a few hours' immersion in water, is made into a jelly, used in Sweden as we use currant jelly. The cranberry (*V.* Oxycóccus) has a peculiar flavour, very generally known, and to most persons agreeable. That it is used in Sweden for no other purpose than cleaning silver plate is to be attributed to the many fine berries with which that country is supplied. Large quantities of cranberries are annually imported from America; not because they are superior to our own, for, though larger, they are not so sweet as our English cranberry; but either because we have not enough to supply the demand, or that they are too easily obtained to be considered as worth having. Whortleberry is a name common to all the species, whether foreign or English. The *V.* formòsum (handsome) is held sacred in China, and placed in the temples, at the commencement of the new year, as an offering to the gods.

Menzièsi*a* is a small genus, very nearly allied to the heaths: of the two species admitted into the English Flora, the first, M. cærùlea is a native of Scotland; the other, M. *p*olifòlia, of Ireland.

Another near relative of the heath, and formerly included in that genus, is the ling, Callùna (to cleanse or adorn). It was removed on account of certain peculiarities in the calyx and capsule; and may be readily distinguished from its former companions, by what appears at first sight to be a double flower. It is a very common plant on dry barren land, and no person who ever snatches a glimpse of the country in the summer months, need be at a loss for a specimen of it. When we first gather it, we believe that we see the corolla between the four green leaves of the calyx, but we deceive ourselves; it is an inner calyx, coloured: the corolla is shallower, paler, and wholly concealed within it; like a delicate little woman who loves finery, and suffers herself to be eclipsed by the splendour of her dress.

The heath, *E*rìca (from the Greek, *ereikō*, to break; why so applied is uncertain), though a very extensive genus, is not so widely disseminated as might be supposed; the vast continent of America does not produce a single species, while the Cape of Good Hope has more than three hundred. We possess but three native heaths, and of these three one is confined to the county of Cornwall. The foreign heaths are so tenderly bred in this country, and so carefully preserved from the roughness of the elements, and vicissitudes of the season, that we see them always, as it were, in full dress: did we see them in their native land, as we do our own heaths, we should not, perhaps, treat the latter with such comparative contempt. The cross-leaved heath (*E. T*étralix) is a remarkably elegant plant, with its flowers collected together into crowded heads: they have a smooth and wax-like appearance, very similar to the blossom of the *Á*rbutus. The fine-leaved heath (*E.* cinèrea) is very common on dry sandy grounds, and is often cut, together with ling, for making brooms, and for fuel. Ling is employed in Scotland in building and thatching cabins, and for rustic beds; in the Isle of Islay it is mingled with malt in brewing beer.

We are told by the poets that Daphne, the fair fugitive who eluded the pursuit of the god of day, was changed into a laurel, with which Apollo crowned his brows, in honour to her memory. The genus that now bears the name, somewhat resembles that noble laurel, chiefly in the leaves. We have two British species. One of them, *D. Mezèreum*, more commonly known by the name of mezereon, bears its blossoms in March, before the leaves appear; they have no corolla; but a rose-coloured calyx, which is sometimes mistaken for one, amply supplies the deficiency in point of beauty, and is exquisitely fragrant. This hardly little shrub is seldom found wild. The scarlet berries are greedily eaten by the hawfinch, greenfinch, and others of that genus. The *D.* Laurèola, commonly called the spurge laurel, is a little evergreen shrub, with drooping leaves and green flowers; the latter oppressively sweet-scented in the evening, but having little or no scent during the day: its berry is black. Both these plants have medicinal properties, valuable in the hands of skilful practitioners, but dangerous when administered by *mock-doctors*, however willingly they may assume the title. Every part is acrid, and produces a fierce burning in the mouth and throat.

Of the genus *Á*cer (sharp, in reference to the juice) we have two species; the maple, *A.* campéstre (champaign), and the sycamore, *A.* Pseùdo-plátanus (false-plane tree). The maple is common in hedges and thickets, and well known by the peculiar form of the leaf, which is five-lobed, cut into five segments. (*fig.* 28.) The wood, which is still used for many light articles, was formerly in great request for cups; and the knots, which were thought to resemble various animals, were prized by the Romans at a most extravagant rate, chiefly for making tables. The expression "to turn the tables upon a person," has been supposed to owe its origin to this taste; which afforded the Roman ladies an opportunity of retaliation, when their husbands remonstrated against the cost-

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liness of their dress and jewels. The sycamore is one of the few trees that thrive best by the sea-side, and being large and leafy, may be employed to defend weaker plants from the winds and salt spray. It is a fine tree when its robes are new; but late in the season is commonly clothed in rags; the fragrance of the leaves attracting various insects, which perforate them in every part, until they have reduced them to the most jagged condition. This tree, like others of its genus, affords a quantity of saccharine juice, which, by evaporation, may be reduced to sugar, but is more commonly converted into wine. The species termed the sugar maple (*A.* saccharìnum) is a North American species, from which many of the inhabitants of that country manufacture their own sugar. Each tree produces from twenty to thirty gallons of juice, pleasantly flavoured, and sometimes drunk fresh as a remedy for the scurvy.

In speaking of foreign productions of this class we may say that the number of heaths alone exceeds that of all the species of the other genera united; and though there is a general and strong family likeness among them, there is also great variety.

The nasturtium, Tropæ̀olum (the diminutive of *tropæum*, a trophy), is a Peruvian genus, of which some of the species are as well known in this country as if they were natives; the greater nasturtium more especially. The seed-vessels are pungent, and much esteemed for pickling; and the flowers are among the most splendid to be seen in our gardens; they look like blossoms of fire, and it seems quite in character that they should emit sparks in the evening, as they were observed to do by the daughter of Linnæus. This plant affords a familiar example of the *peltate* leaf (target-shaped, from *pelta*, a target), a leaf which has its foot-stalk inserted in or near the centre. (*fig.* 29.)

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The genus *A*mỳris is known by some minor articles of commerce which it produces: though of one of them, the Balsam, or Balm, of Gilead, which is the dried juice obtained from the bark of one of the species, it is believed, that it is too scarce to be frequently exported genuine from its native country. From the earliest periods of antiquity till the present day, this balm has been held in great estimation in Syria and

Egypt, as a medicine possessing the most extraordinary virtues. It is mentioned in the *Old Testament*, and by Josephus, as an article of great price. The rose-wood of Jamaica is obtained from a species of *A*mýris.

The Lawsò*nia* inérmis (unarmed Lawsonia) is the henna of the Arabians, with the pulverised leaves of which the ladies dye their nails red.

The order *Digýnia* is small, and of little note. In the third order is the genus *P*olýgonum (*polys*, many, *gonu*, a joint), familiarly called persicaria, or knot-grass. It is a large genus, producing a profusion of small, triangular, black seeds, which, in some of the species, are very nutritive. *P.* Fagopýrum (*fagus*, a beech, *pyros*, corn; its grain like the mast of beech), commonly called buck-wheat, is chiefly used in this country for feeding poultry, or sometimes for making crumpets; but in the United States it is cultivated largely for the use of man. *P.* aviculàre (seeds grateful to small birds) may be called bird's-wheat; its seeds are a great resource to many small birds. *P.* *C*onvólvulus (climbing buck-wheat), also, is a wholesome grain, left to the birds to gather. We have ten British species, most of them common in barren ground, where they spread very fast; the flowers are small, and have no corolla, yet some of them are remarkably beautiful under a microscope; the calyx being coloured, and, in many instances, variegated. Several foreign species are cultivated in our gardens.

The most remarkable production of the fourth order, *Tetragýnia*, is that rare British plant true-love, Pàris (*par*, equal; regularity of parts) quadrifòlia (four-leaved): the flowers are green, as they should be, for youth is the season of love. The leaves are commonly crossed; for, as Shakspeare says, "The course of true love never did run smooth." The fruit is reputed dangerous!

There are two other British genera of this order, and about as many more of foreign growth, but they are plants of little note.

(*To be concluded in our next.*) 3.50

PART II.

COLLECTANEA.

Art. I. *The General Subject.*

Universal Language of Natural History. — If the scientific Latin and Greek names of plants, animals, and minerals were adopted, without alteration, in the languages of all nations, this would, to a certain extent, be a universal language. It would be a considerable point of union between two strangers to call a considerable number of the things with which they were surrounded by the same names; and, in very remote and distant lands, this would operate like a kind of free-masonry. Each would be convinced that the other was, to a certain extent, initiated like himself in the mysteries of Nature. Let none, therefore, despise the mere acquirement of systematic names; and let them always be adopted, in general language, without altering their terminations. — *Cond.*

Mischiefs arising from Changes in Nomenclature. — An affected and unreasonable contempt for the Linnean arrangement has for some time prevailed amongst naturalists of a certain reforming description; finding it necessary, as they must, in order to pave the way for their own improved system, to inspire readers with this feeling. The Linnean system certainly has many and great defects; and no one was more sensible of these, nor would have been more eager to remove them when means and occasion should serve, than the father of classification himself. He had, in fact, pointed out the plan by which his arrangement might be altered or improved; but, in the mean time, he was obliged to rest satisfied with what had been done, and leave to futurity the business of adapting it to the progress of discovery. But, suppose the despised standard of the illustrious Swede were too old and ragged to be any longer fought under, would it have disparaged the importance of any author on natural history to have enrolled himself under the banners of such a man as Cuvier, who appeared at the moment when he was wanted, and who combines so much of the artificial and natural modes of arrangement as is required for prosecuting successfully, for a time at least, the study of natural history? Here was a naturalist *par excellence et par occupation*, a man placed by acclamation at the head of European naturalists, and entitled to give the law. Was his sovereignty insupportable, or would science have retrograded by submitting to his sway? One would make every allowance for ambition or egotism, and refrain from passing any harsh sentence on the numerous aspirants in this department; but they, one and all, seem to forget that they are but amateurs. Most of them have never made of it a profession; they have not devoted their lives to the subject; they have merely fancied it, and made it a pastime. What entitles them to originate systems? Yet do they not scruple to seat themselves in the chair of authority, and frame classes, orders, genera and subgenera, divisions and subdivisions, by the score. To such an extent does this propensity rage, that, if one wish to identify a specimen, it will be necessary to have at hand a number of works for the sake of reference to synonymes; and even then it will be difficult to say which ought to be preferred.

Is science forwarded or retarded by such a procedure? "Speak ye who best can tell." Universality of language is, in the first instance, the main desideratum, and is worth almost any sacrifice. One name is as good as another, if every one understands what is meant by it; and it should be made to serve as long as possible, till observation and information shall have enabled some select and indisputable authority to institute a perfect system of classification and nomenclature. As an example of the evil effects of those embarrassing fluctuations in classification, I may mention that Temminck's *Ornithology* had experienced a very favourable reception. He is a practical ornithologist, who had prosecuted the study for years, had been educated in museums, visiting every cabinet in every capital of Europe; thus establishing a reputation which entitled him to respect. His work was beginning to be generally adopted as a manual, text, or class-book, for European ornithology; it has been rigidly adhered to by Mr. Sabine in his account of the zoological productions of the arctic regions, and by Mr. Selby in the letter-press of his illustrated work on British birds. Last year out comes Dr. Fleming's *History of British Animals*, and, so far as concerns British ornithology, away goes Temminck; and thus are incessantly issuing from the press new nomenclatures and classifications, most of which, from peculiar circumstances, never will, and never can, be accepted by the scientific world. But of these I shall, with your permission, enter into a more particular analysis in my next. I am, Sir, &c. — *Hypercrito. June* 6. 1829.

Art. II. *Zoology.*

The Puruk Sheep of Ladusk. — Sir, Having lately met, in the *Transactions of the Royal Asiatic Society*, vol. i., an interesting paper, by Mr. Moorecraft, on the Tartar population, and productions of the Himalaya Mountains, amongst which he particularly notices a singular breed of sheep, that, he is of opinion, would prove a most valuable acquisition to these countries, if introduced amongst us: to effect which, it appears, he had even taken some steps, though I fear ineffectually, as we have since heard no more about them. As the subject is of some importance, and in unison with the object of your Magazine, I beg leave to send you some extracts from Mr. Moorecraft's paper, in the hope that their publication, through a medium so widely circulated, may excite an enquiry how far his patriotic and benevolent intentions have been carried into effect, or induce an endeavour to fulfil them: now more than ever called for, at a period when our small farmers are every day sinking in the scale of society; and the British cottager, with narrowing means of support, is suffering distress and privation to which he has heretofore been a stranger.

"The Puruk Sheep of Ladusk, when at full growth, is scarcely as large as a South Down lamb, six months old; yet, in fineness and weight of fleece, and flavour of mutton, added to its peculiarities of feeding and constitution, it yields not in merit to any race hitherto described. It gives two lambs in twelve months, and is twice shorn within that space: the clip may afford, in the annual aggregate, 3 lbs.; and the first yield is fine enough for tolerably good shawls. The British flockmaster would be delighted with the fineness of the bone, the spread of the carcass, the hardiness of its constitution, and its aptness to fatten. The Puruk sheep, if permitted, thrusts its head into the cooking-pot, picks up crumbs, is eager to drink the remains of a cup of salted and buttered tea, or broth, and examine the hand of its master for barley, flour, or for a cleanly picked bone, which it disdains not to nibble; a leaf of lettuce, a peeling of turnip, the skin of the apricot, give a luxury: and the industry is indefatigable with which this animal detects and appropriates substances so minute and uninviting, as would be unseen and neglected by ordinary sheep: perhaps the dog of the cottager is not so completely domesticated as it is. I have been minutely tedious upon their acquired habits of feeding, as introductory to the conclusion that there exists not a cottager in Britain who might not keep three of these sheep with more ease than he now keeps a cur dog; nor a little farmer, who might not maintain a flock of fifteen or twenty without appropriating half an acre exclusively to their use: they would derive support from that produce which now either totally runs to waste, or goes to the dunghill. I have procured some of the sheep, and mean to increase the stock to two hundred, leaving them under the care of a respectable lama for two years, at the end of which period my journey will have been completed. Should I fall, an event by no means impossible, government will receive them as a legacy, without expense, under the hope that some of the individuals will be sent to Britain; and in the sure expectation that the progeny will be distributed to cottagers and small farmers in poor and dry countries."

I leave you to estimate the national advantages derivable from two or three millions of extra animals, supported upon produce now really waste; provided their present frugal habits of feeding be maintained, and their present constitution not injured by delicate treatment. I am, Sir, yours, &c. — *John Robertson. Kilkenny, November*, 1829.

A Stoat pursuing a Water Rat through a Pond. — A singular circumstance was observed, a few days since, by a friend of mine. A stoat was in hot pursuit of a water rat, which latter took to the water, where he, doubtless, expected to be safe: the stoat, however, followed his prey across the narrow pond; but lost it, at last, from the rat getting into a hole. — *J. L. Liskeard Vicarage, Cornwall, Aug.* 15. 1829.

The Songs of Birds innate or acquired? — Some naturalists have not scrupled to declare that the song of birds is not innate, but acquired. Mr. Bingley has adopted this theory in his *Animal Biography;* and I am the more sorry for it, because I conceive that he has made an erroneous statement, which can never appear so much misplaced as in an elementary and popular work. I am led to this notice, by the recorded attempt of Sir John Sinclair to establish a colony of nightingales, through the fostering care of redbreasts. It is evident that the worthy baronet is not an advocate for the doctrine of acquirement; and I must place myself on his side, notwithstanding the assurance of Mr. Bingley that it is a doctrine verified by accurate observations, and founded on numerous experiments. It is contrary to my limited experience, and I think at variance with analogy and reason. Every quadruped, as far as we know, has some call or cry peculiar to its species: but I never heard it asserted that that call or cry was any thing more or less than a particular assignment of nature; and why should it be deemed incredible that the notes of the feathered tribe should be a similar endowment? It seems to me that it must be so; it does not appear that the opportunity of acquirement is afforded them. The male bird confines his song chiefly to the period of incubation. During that period he, like a true lover, cheers his patient and sedentary mate, by the greatest exertion of his vocal powers; but, when the callow infants have burst from bondage, he suspends his melody, and, like a good father, assiduously unites in nurturing his family. But, admitting that I err, and that young birds have the privilege of listening to their parents' voice, how comes it to pass that each species, when the air is resounding with the varied melody of Nature's whole choir, is able to select its own appropriate song, and adhere to that and that alone? Here a discriminating power is allotted to the feathered race, in my estimation, even more miraculous than a natural impression, and thus in avoiding Scylla, we fall into Charybdis. The language of man, according to some, is not innate. What man would be in a detached and solitary condition, I am not anxious to know; but sure I am, that the great Creator, when he made him a social animal, completed his work by providing him with a language; and I feel a strong conviction that the song of birds is an appropriation from the same beneficent source. Man can vary and enlarge his language as circumstances and situation may require. He can even acquire new languages; and here is nothing unnatural, but only what we might expect. Some birds possess an imitative faculty which enables them to adopt new calls or notes: but this is altogether unnatural; it occurs only when they are domiciliated and taught by man. In the wildness of nature it is never so. According to my observation in that state, the most imitative species are "true to their song." Were it otherwise, we might hear strange anomalies. The chattering stare might entrance us with Philomela's strains, or the hoary-headed daw might, in midwinter, surprise us with "the welcome voice" of the harbinger of spring. If these observations are erroneous, perhaps Mr. Sweet, or you, Sir, will give me better information.

—— "Si quid novisti rectius istis,
Candidus imperti; si non, his utere mecum."

J. S. Thurgarton, Norfolk, April 17. 1829.

Use of the spurious Wing. — Griffith, in his *Animal Kingdom*, vol. vi. p. 104., mentions, that the use of the small stiff feathers, called the spurious wing (àla spùria), is not apparent. A young gentleman has suggested to me, that the probable use is to protect the insertions of the large quill feathers in the carpus from injury. — *Anon. July*, 1829.

Ducks and Hens defending themselves against Rats. — I have now a fine duck, which was hatched under a hen in the spring of 1828, there being seven young ones produced at the time. When these ducks were about ten days old, five of them were taken away from beneath the hen, by the rats, during the night-time, the rats sucking them to death, and leaving the body perfect. My duck, which escaped this danger, now alarms all the other ducks and fowls in a most extraordinary manner, as soon as the rats appear in the building in which they are confined, whether it be in the night or the morning. I was awoke by this duck last spring, about midnight; and, as I apprehended that the rats were making an attack, I got up immediately, went to the building, and found the ducks uninjured. I then returned to bed again, supposing the rats to have retreated. To my surprise, next morning, I found that ten young ducks had been taken from beneath a hen, and sucked to death, at a very short distance from where the duck was sitting. On this account, I procured a young rat-dog, and kept it in the building; and, when the rats approach, the duck will actually rouse the dog from sleep, and, as soon as the dog starts up, the duck becomes settled again. — *M. Saul. Oct.* 3. 1829.

Food of the Wild Peacock. — Mr. Ranking informs us that peacocks, in a wild state, feed on pepper pods: a fact which he ascertained in a shooting excursion on the banks of the Luckia, in Bengal, when he flushed a flock of twenty in a grass field. One which he shot had in his crop more than a hundred pods of Chile pepper, the smallest and hottest sort known. — *J. R.*

Cock Pheasants. — I do not think it is generally known that cock pheasants (*P*hasiànus *G*állus) crow in concert during a thunder storm. Yet this is certainly the fact; and their shout may be heard, "awakening the echoes," at a distance of two miles. — *J. Murray.*

The Nightingale. — This "poet bird," *M*otacílla *L*uscínia, sometimes displays an eccentric and novel taste in the materials of her nest. One interesting specimen of this kind was wholly constructed of skeleton leaves. —*Id.*

The Carrion Crow and Hooded Crow. — I was not a little surprised to meet with the following question in Dr. Fleming's late work: — Whether the carrion crow (*C*órvus *C*oróne) is different from the hooded crow (*C*órvus *C*órnix). If they are identical, they must undergo changes of plumage to which I have all my life been an utter stranger. Both are found in England: the hooded crow, I believe, chiefly in the course of the winter; but, except an accidental and rare visitant, none save the hooded crow is ever seen in Zetland. The change of plumage from the black to the grey, or *vice versa*, must take place in those who reside, if they do reside, all the year in England, or in more southerly climates; for a feather is not changed in Zetland. I decidedly question the identity; and this the more, that I was always struck with the difference of bulk: and, on comparing the weight, characters, and dimensions, given by Dr. Fleming, the want of correspondence is still more strongly marked. They are as follows: — *Carrion Crow*: Length, 19½ in.; breadth, 26 in.; weight, 10 oz.; bill and legs, black; irides, hazel; tail, slightly rounded. *Hooded Crow*: Length, 20 in.; breadth, 39 in.; weight, 22 oz.; bill, smooth, black, with tip pale; irides, greyish brown; female *wanting* the *grey*; *young*, like the *female*. Here, then, is a difference of 13 in. in breadth, and 12 oz., nearly a pound, in weight. The two statements of the female wanting the grey, and the young being like the mother only, I dare venture to set down as a complete mistake; which I marvel the more that Dr. Fleming should make, since he did himself reside, I believe, several years in the Zetland Islands. But here my personal knowledge enables me to speak with a positiveness which I otherwise should not; for I have taken and tamed the young from the nest: I can, therefore, confidently aver that there is no difference of plumage between the sexes, and that the young are like their parents. — *Hypercrito. June* 6. 1829.

A White Blackbird. April 30. —In a blackbird's nest at St. Austell, Cornwall, in which were two young birds, one of them was perfectly white; and the nest was robbed by a boy, who, in a scuffle with the owner of the garden, killed the bird. It was, however, preserved, and is now in the collection of Mr. Jackson of Looe. — *J. L. Liskeard Vicarage, Cornwall, Aug.* 15. 1829.

Pied Flycatcher and Grasshopper Warbler. — I have met with both these birds in this vicinity. The former has been observed for the last three or four years, but I have not yet seen the nest or eggs. Having slightly winged a male specimen, I was anxious to keep it alive; but, being at some distance from home, I was compelled to carry it in the crown part of my hat for several hours, and it unluckily died the morning following. The latter is not at all uncommon; but as it frequents the thickest underwood, is seldom seen, and is difficult to obtain in good feather. The singular, long-continued, sibilous note of this bird may be heard in the evening; in the daytime its note is much shorter, quite distinct from that which it makes in the evening. One morning, when on the look-out for these birds, I shot the pipit lark of Bewick, imitating the note of the grasshopper warbler, and exactly in the attitude described by him, "gaping and shivering with its wings on the top of a branch." — *W. Farrar, M.D. Aug.* 5. 1829.

A Species of Alcedo, or Kingfisher. — There is another bird in this country which has often excited my surprise and curiosity, and which, I believe, is peculiar to this place. Every day are to be seen numerous flocks of birds, not quite so large as pigeons, with dark backs and white bellies, passing up and down the Bosphorus with great rapidity. When they arrive either at the Black Sea, or the Sea of Marmora, they again wheel about, and return up the channel; and this course they continue, without a moment's intermission, the whole of the day. They are never seen to alight, either on land or water; they never, for a moment, deviate from their course, or slack their speed; they are never known to search for or take any food; and no visible cause can be assigned for the extraordinary and restless instinct by which they are haunted. The French call them *les ames damnées*; and certainly, if being allowed no cessation or repose be included in the idea, it is not misapplied. They fly very near the surface of the water; and, if a boat meets a flock of them transversely, they rise a few feet over it; if directly, it divides them like a wedge. Their flight is remarkably silent; and though so numerous and so close, the whirr of their wings is scarcely ever heard. They are so abundant in this particular spot, that I have reckoned fifteen large flocks in my passage from Pera to Therapia. I have often wished to shoot one, to examine it; but the Turks have such a tender and conscientious regard for the life of every animal but man, that no person is permitted to kill any bird upon the Bosphorus, without incurring their displeasure. The only work in which I have seen it mentioned is, *Andreossis sur le Bosphore.* He calls it Alcyon voyageur, to distinguish it from the Halcyon of the ancients, which was supposed to build its nest upon the waters. (*Walsh's Journey from Constantinople to England.*)

The Throstle. — I agree with Mr. Jennings, that the throstle (*Túrdus mùsicus*) does not line its nest with mud, but generally with some compost of which cow dung forms a part, although I have found them lined entirely with rotten wood. It is a fact also that it invariably lays the first egg whilst the lining is wet. — *T. G. Clithero, April* 17. 1829.

Distinction of Sex in the Woodcock. — Having been taught by an old sportsman the following ready method of distinguishing the sexes of woodcocks by the plumage, I offer it to your notice, in the hope that some one who may have better opportunities for observation than myself may be able to decide whether it is to be depended upon as a sure criterion of the sex: — The front or outer edge of the first quill feather of the cock bird is marked alternàtely with dark and light spots, of a somewhat triangular shape; while in the hen the corresponding feather is without spots, and in lieu of them presents a uniform light-coloured stripe, extending the whole length of the feather The difference will be immediately apparent on examining the accompanying specimens, which are the first quill feathers, plucked respectively from two different birds shot at the same time; the two birds, it may be remarked, in other respects varied sufficiently in plumage to warrant the supposition of their being of different sexes. — *W. T. Bree.*

Voice of Fishes. — I have often heard it remarked that fish have no voices. Some tench, which I caught in ponds, made a croaking like a frog for a full half hour whilst in the basket at my shoulder. — *John Thompson. Hull, July* 20. 1829.

Extraordinary Growth of a Pike. — If you think the following account of extraordinary growth in a pike worthy of being inserted in your entertaining and instructive Magazine, you may depend upon the authenticity of it from an eye-witness: — Four years and a half ago, some jack were turned into a pond belonging to W. R. Cartwright, Esq., in Northamptonshire, the biggest of which weighed 2½ lbs. In October last the pond was let off, and one jack of 19¼ lbs. was taken out, together with five more, from 11 to 15 lbs. each, the largest having grown not quite 4 lbs. every year since its being in. The pond is about two acres and a half, with a small rill running through it, and there was a good stock of carp in it at the time of its being let off. — *A Constant Reader. Nov.* 5. 1829.

Remarkable Flight of Spiders. — On the 19th of July a number of aeronautic spiders (at any rate small black spiders capable of flight) by some means found their way into St. John's church, and, though not a proper place for observations on natural history, there were so many, that, without shutting my eyes, I could not fail noticing them. The tops of ladies' bonnets were generally the places whence they commenced their flight, and in it they seemed not to be confined to any particular direction: some flew upwards at a slight angle, some north, some south, some east, some west;

and in so doing several passed so near to each other, that I cannot conceive, as they passed in opposite directions, that any current of air conveyed them, as two opposite currents could scarce exist so often close to each other. I observed that those which passed near enough to distinguish their forms, all flew with their backs downwards. I do not know if these facts will at all bear on the controversy between Mr. Blackwall and Mr. Murray. Such as they are you have them. — *John Thompson. Hull, July* 20. 1829.

Winter Quarters of Leptùra mìcans. — The most trivial facts connected with natural history may tend to illustrate the science, and tend possibly to other discoveries. I shall, therefore, make no apology for communicating the following: — On examining some stems of the *Arúndo Phragmìtes*, which I had drawn up by the roots from the side of a pool, the bottom of which was thick mud, I observed the portion of the plant immediately in contact with the root rather thickly studded with certain egg-shaped transparent brown cocoons (*fig.* 30. *a*), which I concluded to be the winter covering of some aquatic insect in its larva state. On examining these water-proof cases, which were about half an inch long, I found each to be the winter quarters of the Leptùra mìcans (*b*). On extracting the insect, it appeared to be in a semi-torpid state, but perfectly well fed, and in good condition. We know that many of the Coleóptera retire to peculiar haunts for the purpose of hybernation; but I am not aware that there are many facts on record proving that in the perfect state insects of this order construct habitations suited to the occasion: and it is still more extraordinary, that the imago of this species, which invariably dwells above the surface, and is capable of active flight, as must be known to every naturalist, who in the summer season, during the heat of the day, has watched the reedy boundaries of a marsh or pond, should descend some feet into the water, and there construct a dwelling impervious to water, in which, so far from its being their natural element, they are soon drowned. On the whole, I am more inclined to suspect that the old ones, at the close of summer, lay their eggs, which hatch in due time, and that the larva is the architect of these cocoons, in which, after a speedy change, the perfect insect is developed, and remains cradled in its tomb till the genial suns of the next season call it forth. It should be remarked, however, that on exposing these cocoons to water heated to about 85°, they evinced no symptoms of increased activity. By what extraordinary process, moreover, do these submarine sleepers continue to construct a case from which water must have been excluded during the whole operation? — *E. S., F.L.S.*

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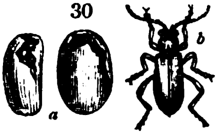
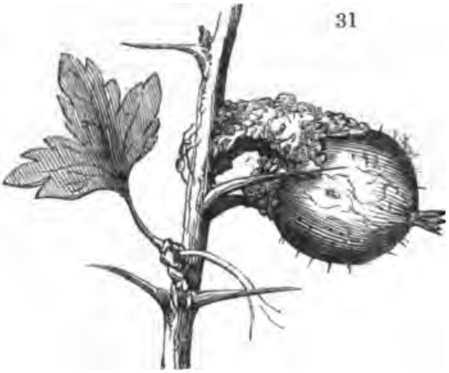


Ants and Aphides. — Sir, The ants and their interesting habits have something so much bordering upon the marvellous, that many persons have been induced to discredit much which has been published upon the subject; but, singular as their history appears, every day's observation proves that much more might be written on their instinctive carefulness and extraordinary sagacity. The annexed sketch (*fig.* 31.), may furnish additional interest to their history, as well as pleasure to your readers. A gooseberry tree in my neighbourhood was observed to be infested by aphides, on which a number of black ants were seen actively employed upon the leaves and fruit. On a closer examination, they were discovered to be constructing mud roofs, or archways from the stem of the plant to some of the fruit, leaving a part of the same uncovered. Within this dome, or archway, a small flock of aphides were studiously retained by the ants. Thus sheltered from the rain, which has so abundantly fallen this summer, they nourished themselves, and afforded their sagacious shepherds that honey dew which it is well known they seek with so much assiduity. Over some of these archways they had carefully glued a leaf of the tree, so disposed that the rain might easily glide off, and thus the mud roof was rendered impervious to the wet. As a further instance of instinct, the fruits thus erected upon had been chosen, or first ascertained to be firmly fixed between two of the spines, as in the sketch, or confined by the leaves and branches of the tree. Linnæus truly called the aphides the cows of the ants. — *F. C. L. Guernsey, Sept.* 21. 1829.



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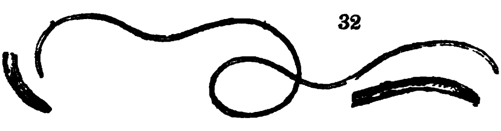
The Water Beetle. — I observe that one of your correspondents notices the probability of ponds in elevated situations being stocked with fish through the agency of the water beetle. If this active and voracious little creature were really useful that way, it might in some measure atone for its other mischievous propensities; for I do not know a more destructive little insect to fish themselves, besides devouring the spawn. A neighbour of mine lost several hundred of the fry of the gold and silver fish by this little pest; and, to leave no doubt about the matter, he caught one, and placed it in a large basin of water, to which he shortly after added a little fish. The beetle immediately made a dead set at the fish, which completely paralysed the poor little animal; for it was soon after seized near the tail by the beetle, without making any effort to escape, and never left till it was a perfect skeleton similar to numbers that he had previously found. — *J. Elles. Feb.* 1829.

Tenacity of Life in the Weevil Tribe. — About a year ago, in the month of May, I captured, near Windsor, in the young sprouts of the willows, which grow in profusion in some places on the banks of the river, six weevils most resembling the Curcùlio *l*ápathi of Marsham. Having conveyed them home, I put them into spirits of wine for upwards of half an hour, a time which is sufficient to kill by far the greatest portion of insects; and afterwards having taken them out, I transfixed them with pins. In about ten minutes they were all alive, and writhing on the pins in a manner horrible to look at. I therefore put them a second time into spirits of wine for a longer time than the first. But having taken them out, very few minutes elapsed before two of them were again kicking about their legs; so, to try what they would do, I took out the pins, and put them under a cocoa-nut shell, in the top of which there was a hole. The one truly died, as well it might, but the other in a very short time crawled out at the hole in the top, and was soon as vigorous as it was previously to its being captured, and I then gave it its liberty. The pins with which they were transfixed were of a large size. I also one day observed a weevil on a stalk of grass, which taking up and examining, I perceived a hole in the elytra, by which all the intestines, and even the very wings, and every thing except the shell had been extracted. There was an individual of the Cárabus cùpreus species on the same bit of grass, by whom I suspect it had been done. I found another weevil in a spider's web served in the same manner. Both were apparently as active as they ever were. — *C. Lambe. May* 6. 1829.

Filària forfículæ (*fig.* 32.) — These specimens of intestinal worm were taken last autumn from the Forfícula auriculària, or common earwig. I have very frequently found them in this insect, and sometimes two or three in a single individual, each not less than 3 in. long. Thus the whole cavity of the abdomen of the earwig has been closely tenanted; and, in some instances, I have found a portion of the worm within the trunk of the insect, whilst part remained in the abdomen. After being removed from their natural habitation they will sometimes live in water two or three hours; but, exposed to the atmosphere, they die almost immediately. The worms of the genus Filària, to which the present subjects belong, are known to infest animals of various denominations, beasts, birds, and insects; and even the larvæ of insects: but the extreme simplicity of the structure of great part of them, as far as man can make himself acquainted, defies every attempt at specific distinctions, therefore they have been named after the subjects in which they are found, without the addition of trivial characters. These I have labelled Filària forfículæ. This white, or very pale yellow, opaque, threadlike inhabitant of the Forfícula auriculària I have usually found from 3 in. to 4 in. long. The specimens herewith sent were rather more when deposited in the spirit, which was effected immediately after their removal from their natural habitat. Your readers will have no difficulty in procuring subjects for their own examination. As connected with this pursuit it may not be amiss, in your Magazine, to recommend every one who is in the least degree interested therewith to provide himself with a wide-mouthed flint-glass bottle, of the size suited to the subjects generally collected. If this be partly filled with rectified spirit of wine, and kept as a common repository to receive specimens indiscriminately as they are collected, it will be the means of preserving many that would otherwise be lost on account of the trouble of providing separately for them at times when it may be inconvenient. Another advantage offered by this method is, that when specimens are taken from this stock-bottle, as it may be termed, and put into fresh spirit, they never tinge it with any colour, which will sometimes happen with the fluid in which reptiles or insects are first deposited. —*B. Maund. Bromsgrove, October* 24. 1829.



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The Polybràchion (many arms) is an animal described in vol. iii. of the *Zoological Journal*, by the Rev. Lansdown Guilding, and on which I send you a few remarks. From the vast variety and extent of nature's productions it is not to be wondered at that observers placed in isolated situations, and reduced to the comparatively narrow compass of their own resources, should occasionally describe, as new, individuals which have been long known, or promulgate, as discoveries, facts with which naturalists have been long familiarised. It is to be hoped that the fear of incurring this censure will not discourage any from communicating to the world what they may deem new or interesting; for it is certainly better to err in so doing, than to run the risk of losing what may perhaps be found of the first importance to the progress of natural knowledge. The great extent of nature and limited resources will always be deemed a sufficient apology for mistakes of the kind alluded to, by the candid and considerate; those naturalists, however, who live in the midst of splendid collections and extensive libraries, and have the means of direct communication with persons skilled in the particular branch of the science to which any discovery may appertain, can hardly expect to meet with the same indulgence. These reflections apply to the description given by the before-named very zealous and intelligent naturalist of an animal discovered in the Caribbean Seas, and to which he has given the name of Polybràchion, without being aware of its having been previously observed and described as a species of Porpìta viz. P. glandífera (*Encyc. Meth. Pers.*), and of which a very characteristic figure is given in the volume of plates (pl. 90. fig. 6, 7.). We have gained, however, a very beautiful and exact representation of this animal from the pencil of the reverend gentleman, and some additional and important facts relating to its mode of propagation. (See *Zool. Journ.*, vol. iii. p. 403. and pl. 10.) — *X.*

Art. III. *Botany.*

Botanical Frauds. — Sir, Mr. Dovaston (Vol. II. p. 400.) very honestly confesses the *botanical fraud* (if I may be allowed the expression without offence) which he has committed, in having naturalised *A*ntirrhìnum Cymbalària in a variety of wild situations, thus candidly making this public acknowledgment, lest botanists should be misled in imagining this elegant little foreigner to be truly a native. Similar *frauds* equally innocent have been practised, I apprehend, to a larger extent in various parts of the country. I was informed, some years ago, that a party of botanists, making a tour in the neighbourhood of Ingleborough, carried with them the seeds of several exotics, such as they thought likely to become naturalised in this country, and scattered them in suitable situations during their progress. A list (as I was informed) of the species thus attempted to be introduced was kept, to serve as a record of the fact. The only plant I recollect as being mentioned to me was *S*cílla campanulàta. Should this be observed by any future botanist in the above apparently wild situation, he must not therefore too hastily conclude it to be a native, since, in all probability, its claim to British origin rests on no better grounds than Mr. Dovaston's *A*ntirrhìnum.

Dr. Sibthorp, in the preface to his *Flòra Oxoniénsis*, speaks of several suspicious natives, of which he is doubtful whether or not to enumerate them as indigenous. "Sub ipsis denique muris urbis rariores stirpes oculis occurrunt, quæ tamen, cum peregrina sint facie, dubito utrum inter indigenas enumerandæ sint: e. g. *H*ieràcium cerinthöìdes [*], *S*enecionis species, et Cymbalària," &c. [†] This "*Senecionis species*," I have no doubt, is *S.* squálidus. Some years since I introduced this plant from Oxford into my garden, whence, by means of its volatile seeds, it has made its escape, and has now, for a long time, voluntarily and firmly established itself on the walls and waste banks of this village. Sir J. Smith observes, in *English Botany*, that *S*enècio squálidus " grows abundantly on almost every wall in and about Oxford, and, though long since noticed there by Sir Joseph Banks, it has not found its way into the *Flòra Oxoniénsis*." Sir J. Smith was probably not aware of the doubtful origin of the plant, nor that the " Senecionis species," mentioned in Dr. Sibthorp's preface, alluded to *S.* squálidus. — *W. T. Bree. Allesley Rectory, Sept.* 8. 1829.

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[*] *Query*, *H*ieràcium amplexicaúle? which grows on walls at Oxford, and, being of foreign origin, is, probably, no more than "horti rejectamentum."

[†] "Under the very city walls rarer plants meet our eyes, but, from their foreign aspect, I doubt whether they should be enumerated as natives; for example, *H*ieràcium cerinthöìdes, a species of *S*enècio, and Cymbalària," &c.

*T*ỳ*pha latifòlia.* — Sir, Having lately examined many specimens of *T*ỳpha latifòlia, and finding in them a character not noticed in several botanical works which I have consulted, I take the liberty of sending you the accompanying sketch and description (*fig.* 33.), thinking it may interest some of your readers.

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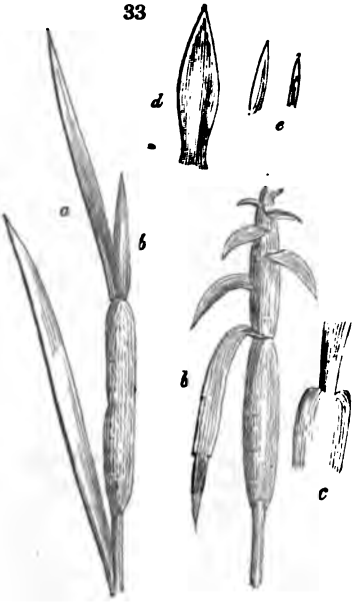

a, A leaf arising at the base of the female catkin, sheathing the whole of the spike.
b, A leaf arising at the base of the male catkin, and enveloping that part of the flower.
c, The base of the leaf *a*, at the commencement of the sheath.
d, A membranous leaf on the male catkin, above the leaf *b*.
e, Small linear membranous leaves, or bracteæ, near the top of the male catkin.

Before the plant comes into flower the whole of the spike is enveloped in a sheath with membranous edges, which rises from the base of the female catkin, and terminates in a leaf, which, with the sheath, is about twice the whole length of the spike. This leaf first falls as the flower swells, previouslyto the male catkin coming into blossom. At the base of the male catkin, and with its membranous base sheathing the whole of it, arises another leaf, which is altogether about twice the length of that part of the spike: above this are several other *alternate* membranous leaves or bracteæ (4 to 8) diminishing in size as they approach the top of the catkin, which they all reach, and the lower ones sometimes extend a little beyond it. Several of the upper ones are very small and linear. I am, Sir, &c. — *W. C. T. Wallington, July* 31. 1829.

A monstrous Cowslip. — Sir, I reside in a country abounding with the beauties of Flora; and, ere long, it is probable that I may be able to present you with a somewhat particular account of them. Among other flowers, we have abundance of that beautiful and useful ornament to our meadows, the cowslip (Prímula vèris). There is something remarkable in the arbitrary choice of situation (if I may use the expression), which this plant evinces. I find it diffusely, and pretty regularly scattered over our downs; abounding in such profusion, as to throw over our meadows, in some particular spots, an almost uninterrupted tint of golden yellow; while in other situations, and those not remote from the last mentioned, not a single cowslip is to be seen. In the year 1824, I brought home a good root, with about seven or eight blossom buds on it, and planted it in my front court. The soil was composed chiefly of calcareous sand and vegetable earth, blackish, and perfectly light. In 1825 the cowslip, as far as I can recollect, came into flower again, but without exhibiting any striking appearances. In 1826, I noticed that the advancing umbel, while yet buried in the centre of the leaves, exhibited a vast and bulky mass. I watched its progress, and at length it threw up, and fully expanded, the flower which I now send you. The peduncle, or flower-stalk, did not retain its usual cylindrical form, but was grooved and channeled, as if two or three stalks had become laterally united. We counted fifty-three blossoms when the flower was cut, with a view to dry and preserve it. It was so preserved, and in drying two of the flowers were detached; the whole have acquired a greenish tint, except near the mouth, where the natural tint of orange is tolerably well retained. Close by the side of this enormous cowslip grew a little one, which I had recently brought from the summit of a chalk down. This cowslip flowered also: it might possibly be from 2 to 3 in. in height, while the large one lifted its expanded umbel to the altitude of at least 9 in., — a giant by the side of a pygmy. Both flowered at the same time; both within 6 in. of each other; the one produced fifty-three large flowers, the other three of only a moderate size. As this communication has no other object than the introduction of a curiosity, I shall bring it to a close, by remarking that the large plant died after performing this feat; it perished in its greatness, and in the following spring not a trace of it remained. I am, &c. — *Electricus. Grove House, April* 24. 1829.

A singularly brilliant golden green Light. — When making a tour in Cornwall in the year 1815 I was struck by a "singularly brilliant golden green light," similar to that described in your Magazine (Vol. II. p. 406.) On looking into a small cavern by the roadside, near Penryn, I observed in its recesses a small moss (apparently minute plants of Dicrànum taxifòlium), which, when seen in some particular positions, appeared of a most beautiful emerald-green colour with a phosphorescent brilliancy. In De Luc's *Geological Travels*, vol. iii. p. 131., is the following account of a similar phenomenon: "Passing by Botter Rock, Mr. Hill led me to a part of the foot of that Tor, where there are hollows like small caverns; and in these he showed me a vegetable phenomenon, which I had never seen but in the granitic mountains separating the country of Bayreuth from Bohemia. The innermost part of these cavities is lined with a very pretty moss, which reflects the light in the same manner as the eyes of a cat. So little light reaches these remote recesses, that, on looking in from without, they appear quite dark; but, when viewed from a particular point, the part of the rock which is covered with this moss is suddenly seen to shine with a fine emerald-green." — *W. C. T. September*, 1829.

Art. IV. *Geology.*

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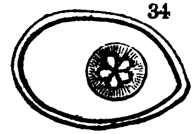

A Star-stone on Flint. — I send the enclosed full-size sketch (*fig.* 34.) of an impression of a star-stone on flint, not because I think it rare, but in hopes that some of your correspondents may be able to say whether star-stones in general have or have not been thus radiated, and thereby throw some light on the origin of these elegant fossils. — *Y. December*, 1829.

Cònia poròsa. — Sir, It has been asserted that no fossil species of Còniæ have been found. I had, however, the pleasure of gathering, last year, from the crag pit in Tattingstone Park, Suffolk, a very perfect specimen of "Cònia poròsa" attached to an ancient fragment of a *P*écten. I beg to add, that a gentleman who was studying the crag formation at Waltham, in Essex, showed me, about a month since, a very beautiful, though extremely minute, *E*chìnus, with one of its spines uninjured, which was taken from the Naze Cliff.

I believe these are new discoveries; at any rate they are an addition to the list of *unpublished* crag fossils given by S. V. W. in your Magazine (Vol. II. p. 246.), although some of the shells in that list had been previously published, and by Mr. Taylor himself, in the Magazine of Natural History (see Vol. II. p. 26.), as may be seen on comparing the lists. I am, Sir, yours, &c. — *W. B. Clarke. East Bergholt, Suffolk, September* 3. 1829.

PART III.

MISCELLANEOUS INTELLIGENCE.

Art. I. *Natural History in London.*

The Zoological Society. — In a letter to Lord Lansdowne, the president of this Society, published in the *Times*, Jan. 22., the writer entreats the president to take warning by the fate of the Horticultural Society; "the same influence which guided and fostered the expense at the gardens at Chiswick, mainly directing the expenditure in the gardens in the Regent's Park, and, what is of still more consequence, of the farm at Richmond." The advice, we trust, will not be lost. We chiefly notice this letter for the following remarks: —

"I should regret to see the Zoological prematurely sink, as the other society has done: it will, if well conducted, and if the suggestions of the scientific members be properly listened to, afford great assistance in the advancement of natural history; and all must agree that it is the means of much rational amusement to the inhabitants of London. I cannot help adding a further benefit which has arisen from this society. The conduct in England of what is termed the public, in public gardens, &c., has hitherto been proverbially bad, — cutting, tearing, and destroying every thing they could lay hands on; and the contrary behaviour of the French has always been tauntingly referred to. Now, I am one of those who considered that much of this conduct of our countrymen arose from the mode in which they were treated. The dealing with a man as if he were a thief is the surest way to make him one: the very extended admission allowed to the public has, for the first time, created a sort of interest which never existed before in what may be considered in some measure as public property; and I know I am correct in saying that, notwithstanding the immense numbers admitted to the gardens in the Regent's Park, there has been no one instance of misconduct: so that, independently of the advancement of science which will result from the Society, I think its menageries may be made the means of working considerable good in the character of the people, and at the same time afford them a rational and cheap amusement." — *Philo-B.* (*Times*, Jan. 22. 1830.)

We have repeatedly adverted to this subject in both our Magazines. The observation of the productions of nature is the first step in the progress of rational education; and the study of natural history, which is nothing more than the improved or cultivated observation of nature, is not only best calculated for calling forth and strengthening the reasoning powers, and for resisting the natural tendency of man in a state of ignorance to superstition and fanaticism, but also for softening and ameliorating the heart and the manners. If Kensington Gardens were sprinkled with groups of the finest flowers, and ornamented with copies of the noblest statues of antiquity, there is no one who entered these gardens who would not learn to respect them; and in a short time acquire a taste for them, and delight in looking at them. This is the case at Paris, Rouen (*Gard. Mag.*, vol. v. p. 498.), strikingly so at Frankfort (*Ibid.*, p. 209.), and more or less so at most of the great cities on the Continent. As the London populace is at least as well instructed as that of Paris, and certainly better fed, there is nothing to hinder us from concluding that the same causes would produce the same effects here; unless, indeed, it be the climate, and something in the character of our variety of the species. But man, in every climate and of every variety, is an animal that may be trained to any thing; and it will be the fault of government if the British people of every rank become not in all respects what they ought to be. — *Cond.*

Art. II. *Natural History in the English Counties.*

Surrey.

LÍLIUM Mártagon. — I have the pleasure to add to the British Flora *Lílium Mártagon*, which I have seen in great abundance in a wood at Woodmanstone, near Epsom, Surrey. I was first made acquainted with it in the summer of 1826, by an inhabitant of the place, who informs me he observed it about 45 years ago. Should any botanist desire some of these presumed indigenous specimens, or the Messrs. Sowerby for the *English Botany*, I shall be most happy to supply them next season. — *Alpha.* *Oct.* 14. 1829.

KENT.

The Canterbury Philosophical and Literary Institution. — It is particularly gratifying to me to remark that the Institution, and more especially the Museum, are very flourishing, scarcely a week elapsing without some new additions. This week we have received a present of fifty birds, shot in the mountains near Madras, and presented by the governor, S. R. Lushington, Esq. Among them the wild fowl, cock and hen, the probable origin of our domestic breeds, are very beautiful. — *W. Masters. St. Peter's Street, Canterbury, Jan.* 3. 1830.

BEDFORDSHIRE.

Cùculus canòrus. — The cuckoo arrived here on the 21st of April, and continued to charm us with his twofold note till the 28th of July. The last bird I saw of the species was on the 4th of August, — *W. H. White. Bedford, Nov.* 25. 1829.

Hirúndines. — The *H*irúndo rústica, or chimney swallow, arrived here this year on the 26th of April; but the nights about that time being very frosty, and a strong breeze blowing from the N.W., they entirely disappeared, and did not appear again till the 3d of May. The house marten (*H*irúndo úrbica) arrived on the 6th of May, and the swift (*C*ýpselus *A'*pus) on the 8th of May. I have not seen a single sand marten (*H.* ripària), probably owing to this neighbourhood lying very low, and there not being convenient places for them to build in. The house marten and the swift took their departure on October 27.; but the chimney swallow was flitting about, in " many an airy ring," on the 4th of November; on the 5th, not one was to be seen. — *Id.*

Meteors. — On the evening of Monday, the 16th of November, several small brilliant meteors appeared in the east, emitting beautiful white and bluish lights. These were succeeded, about 10 o'clock, by one of a deep red colour: it was apparently about 3 in. in diameter, and at the height of from 25° to 30°. It descended in a south-easterly direction, leaving behind it a train of sparks 5° or 6° in length. The weather was mild, and the wind blowing gently from the west. — *Id.*

HUNTINGDONSHIRE.

A new Locality for some less common Insects. — Sir, Supposing that it might be acceptable to your entomological readers to be informed of a new locality for some of our less common insects, I forward to you the following list (some of which, I believe, are considered rare) of those taken by myself during the last week of June and first of July, this present year, at Monk's Wood and the fen lands in the neighbourhood of Sawtry, near Huntingdon. I should not have troubled you with this, but that the locality was discovered within the last two years, and is, therefore, not generally known to entomologists. This list would have been much larger, had it not been for the number of insects which I took, with the names of which, being a young entomologist, I am unacquainted. I am, Sir, &c. — *Charles C. Babington. Cambridge, Oct.* 20. 1829.

*P*apílio Machàon.
Leucophàsi*a s*inàpis.
Pìeri*s cratæ'*gi.
Melitæ'*a* A'rtemis.
Argýnni*s* Aglàì*a* and Pàphi*a*.
Cýnthi*a c*árdui.
Apatùr*a* I'ris.
Hippárchi*a* Galathè*a*.
Thècl*a pr*ùni.*
Lycæ'n*a* díspar.
Thýmel*e* alvèolus.

I'n*o s*tátices.
Deilóphila Elpèno*r*.
*C*ósus ligniperda.
Gastrópacha *q*uercifòlia.
Hypercómpa domínula.
Euthemònia rússula.
Nemóphila *p*lantáginis.
Callimórpha jacobæ'*æ*.
Plùsia Iòta.
Adèla De Geer*élla*.
Cámpylis díspar.

Rhynchites pubéscens, æquàtus, *b*étulæ, and *p*ópuli.
Apodèrus avellànæ.
Pogonócerus nebulòsus.
*S*apérda *p*opúlnea, *c*árdui, and cylíndrica.
Chrysomèla *p*ópuli, and *t*rémulæ.
Cryptocéphalus Mor*æ*'i.
Anáspis frontàlis and ruficóllis.

CAMBRIDGE.

Desiderata to the Collection of British Birds in the Museum of the Cambridge Philosophical Society: —

*C*ircus cineràrius, Ash-coloured Harrier.
*S*ýlvia suécica, Blue-throated Warbler.
*A'*nthus Richárd*i*, Richard's Pipit.
Plectróphanes lappónica, Lapland Bunting.
*A*laúda rùbra, Red Lark.
Lóxia Pityopsíttacus, Parrot Crossbill.

*P*icus villòsus, Hairy Woodpecker.
Colúmba *L*ívia, Rock Dove.
*P*hasiànus torquàtus, Ring-necked Pheasant.
*A'*rdea purpùrea, Purple Heron.
Egrétta, Great White Heron.
æquinoctiàlis, Little White Heron.

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* Of Curt. Entom. 6. 264.; and Ste. Sys. Cat. 5862.; not of Ste. Ill. H. 1. 77. but 2. 69. note. Of this insect no native locality was known, till it was discovered by me, as above: it had been found by a dealer, last year, who would not give the habitat.

rallöìdes, Squacco Heron.
  lentiginòsa, Freckled Heron.
Platàlea Leucoròdia, Common Spoonbill.
Cicònia álba, White Stork.
  nìgra, Black Stork.
Scólopax Sabìni, Sabine's Snipe.
  grìsea, Brown Snipe.
Trìnga rufèscens, Buff-breasted Sandpiper.
Lóbipes hyperbòreus, Red Phalarope.
Gallínula pusílla, Little Gallinule.
Cursòrius Isabellìnus, Cream-coloured Courser.
Plectrópterus gambénsis, Spur-winged Goose.
A'nser fèrus, Wild Goose.
Bérnicla ruficóllis, Red-breasted Goose.
Tadórna rùtila, Ruddy Goose.
A'nas strépera, Gadwall (female).
Querquédula glócitans, Bimaculated Duck.
Clángula histriónica, Harlequin Duck.
Fulígula rufína, Red-crested Pochard.
  Marìla, Scaup Duck.
Somatèria mollíssima, Eider Duck.
Oidèmia nìgra, Scoter Duck.
  fúsca, Velvet Duck.
  leucocéphala, White-headed Duck.
  perspicillàta, Black Duck.
Pódiceps aurìtus, Eared Grebe.
  rubricóllis, Red-necked Grebe (adult).
Colýmbus glaciàlis, Northern Diver.
  árcticus, Black-throated Diver.
  septentrionàlis, Red-throated Diver.
A'lca impénnis, Great Auk.
Cárbo cristàtus, Crested Shag.
Stérna Dougállii, Roseate Tern.
  ánglica, Gull-billed Tern.
Làrus glaúcus, Glaucous Gull (adult).
  islándicus, Iceland Gull.
  capistràtus *Temm.*
  Atricílla *Temm.*
  minùtus, Little Gull.
Léstris Pomarìnus, Pomarine Gull.
Procellària glaciàlis, Fulmar.
Puffinus Anglòrum, Shearwater.

Mr. Leadbeater, No. 19. Brewer Street, Golden Square, is employed by the Society for stuffing their birds, and will prepare any of the above for them, if sent to him. At the same time, notice of any bird presented should be addressed to the secretary of the Society at Cambridge. — *J. S. H. Oct.* 16. 1829.

Exchanges of Specimens. — There are a catalogue of the Botanical Museum and Library, another of the collection of British birds purchased by the Cambridge Philosophical Society, and lists of the plants collected during the herborisations of Professor Henslow and his pupils. These catalogues and lists will be useful to other societies and collectors, in the way of leading to exchanges of duplicates. — *Cond.*

SUFFOLK.

Orchídeæ found in the Neighbourhood of Bungay.

O'rchis pyramidàlis.
  mòrio (with white, pink, purple, and purple and white flowers.)
  máscula.
O'rchis latifòlia.
  maculàta.
Gymnadènia víridis.
  bifòlia.
O'phrys *muscífera.*
  apífera.
Neóttia spiràlis.
Listèra ovàta.

Some of the more uncommon Plants growing in the Vicinity of Bungay.

Verónica montàna.
I'ris fœtidíssima.
Prímula elàtior.
Anagállis tenélla.
Parnássia palústris.
Ornithógalum lùteum.
Epilòbium angustifòlium.
Chlòra perfoliàta.
Dáphne Laurèola.
Pàris quadrifòlia.
Diánthus Armèria.
Cómarum palústre.
Aquilègia vulgària.
Ranúnculus Lingua.
Orobánche màjor.
  mìnor.
  ramòsa.
Cardámine amàra.
Nastúrtium sylvéstre.
Gerànium phæ'um.
Málva moschàta.
Láthyrus A'phaca.
  Nissòlia.
Hieràcium umbellàtum.
Hippocrèpis comòsa.
Bìdens cérnua (flóribus radiàtis).
  tripartìta.

I had, this summer, the pleasure of gathering, on Royden Fen, near Diss, Norfolk, besides other plants, Maláxis Lœsèlii, Epipáctis palústris, and Clàdium Maríscus. Epilòbium angustifòlium, mentioned above, I discovered in a wood at Hedenham, about three miles from Bungay, during the last summer; and it appears that, till that time, no one was aware of its growing in this part of the country. Pàris quadrifòlia grows abundantly in the same wood. I am, Sir, yours, &c. — *Daniel Stock. Bungay, Suffolk, Oct.* 18. 1826.

NORFOLK.

Natural History of the Neighbourhood of Cromer. — Sir, Perhaps, in your county intelligence, you may like to insert the following observations, chiefly relating to the past year, and made in the neighbourhood of Cromer, Norfolk: —

Through the whole of the year 1829, the weather was uncommonly stormy: the fishermen scarcely remember such a succession of gales, and so long a continuance of north-east winds. Vegetation was, consequently, much injured; the sycamores, beeches, and other early trees, suffered extremely from the gale towards the end of May, and in many places did not fully recover their foliage. The ash trees came out so late, that they, in some degree, escaped. I find, on reference to an account kept in Barrington's ruled journal, that, in exposed situations, the ashes were scarcely in full leaf on the 12th of June, and the same trees were again despoiled of their leaves by the 20th of October. I do not know whether it be worth noticing, that, in this part of the country, there were scarcely any cones on the spruce fir, which generally produces an abundance, and they were unusually plentiful on the silver fir.

The hard frost which set in about the middle of January brought numbers of ducks to our coast, especially upon the Salthouse and Blakeney marshes; amongst these, the lapmark, or tufted duck, and the golden eye were unusually frequent. An eagle was also seen about this time, not a very rare occurrence: one was seen lately, and several, in former years, have been shot at Gunton and Felbrigg. The Royston or Kentish crows (*Córvus Córnix*) were observed during the Easter week (April 19th to 26th), congregated on the cliffs for their departure; the last was seen on the 26th of April, and they were with us again by the 6th of October. Woodcocks lingered till about the 7th of May, and some had returned to us by the 8th of October; and, owing to the north-east winds, they have been very unusually plentiful this winter. The short-eared or woodcock owl was noticed about the middle of October. The swallow appeared on the 11th of April, and I saw one as late as the 30th of October. A wryneck was shot on the 18th of April; the cuckoo was heard on the 17th of April; and, about this time, a crossbill's nest was found. The goatsucker was heard on the 17th of May, and continued whirring till the end of July; they hatch on the low fern hills of this neighbourhood. Flocks of larks were observed at sea, coming over, during the third week in October; and also flocks of hen chaffinches. Small hawks were very numerous last summer; but of the rough-legged falcon (Fálco *Lagòpus*), of which five or six specimens are often killed in a season, I only saw one last autumn. As the year advanced, the harbingers of rough weather increased: a snow bunting was seen on the 26th of October; the stormy petrel was frequently observed near the shore; and the water-birds returned early to the marshes. Large flocks of wild swans arrived; in one flock, 21 swans were counted. I should mention that on these marshes are to be found smews, oystercatchers, and avosets, with the usual variety of knots, stints, and others of the smaller *Charàdrii* and Trîngæ, which make their nests there towards the end of April. We have given some attention to the gulls; and we believe that the young of most kinds are spotted. One which we had young, in the autumn of 1823, and which proved to be the large black-backed gull, did not acquire his full plumage till the summer of 1827; his bill turned from black to yellow, but the scarlet spot was not perfect till July, 1828: the next spring he died. These large gulls are more easily tamed than the smaller ones, and are intelligent birds. We never allow of the cruel and disfiguring practice of pinioning birds; and we merely cut the quill feathers on one side: so that, after moulting, such birds as have been brought to us unmaimed regain the use of their wings. One of our gulls, a spotted wagel, which would become a black-backed, thus, after a few months' domestication, took flight about the end of July; he returned to us during the gale of the 28th of August, very hungry. After this, he continued to sail backwards and forwards, between our house and the sea, and would sometimes leave us for a week or a fortnight, but he always recognised us on his return, and ran up to the windows to be fed. He, however, began to domineer over his less fortunate companions, and beat the other gulls and shell-ducks without mercy; he has now been absent many weeks, and we fear he may have been shot. We tried, this winter, to tame a gannet, but without success; he was a savage bird, scarcely to be propitiated by sprats and herrings, and he died when we had kept him a fortnight, probably of some unseen wound.

The only rare insects I saw last year were a couple of mole-crickets; and some young friends of ours, who are entomologists, tell us that butterflies were particularly scarce, doubtless from the coldness of the weather. The Cýnthia cárdui (or painted lady butterfly), however, appeared last year. I got a walking toad (*R*àna *R*ubèta) in the summer, which, I believe, is not common here. We have not many reptiles; more vipers than snakes.

I wish I could give you a satisfactory account of the productions of our sea, but, I believe, they have been very imperfectly explored. Our fisheries are nearly restricted to those of the herring and mackerel, with crab and lobster catching. There is a little line-fishing, but we seldom find any thing taken but skate, codlings, and a few codfish. I am convinced more might be done; and, last summer, we did make the discovery that our soles were abundant and excellent, though rather small. The tides run very strong on this coast; and this, with the sudden changes of the weather, presents an obstacle to the setting of nets; but I hope improvements may be made in the construction of nets, which may extend the captures. A nice kind of salmon-trout is sometimes taken in our mackerel nets, and we now and then get a red gurnard or a red mullet. Of fishes which are not eaten, we frequently meet with the sea-bream and the lump-fish; we occasionally see a pocket-fish (Lòphius), and some large species of the shark race. We heard of a shark, last April, which was called a bottle-nosed shark, nearly 8 ft. long, which ran upon the rocks at Cromer, with a porpoise in its mouth; and, in the summer, we saw an angel-fish (*S*quàlus *S*quatìna). We have very few shells, but some beautiful star-fish and Medùs*æ*. I have seen the cuttle-fish from the length of an inch to its full size; and, after the gale of last November, the beach was strewed with living sea-mice (Aphrodìt*a* aculeàta), and with skates' eggs. These last I had before supposed to be a vegetable production; but, in each that I opened, I now found a living long-tailed skate. They are of a dark colour, and have four pointed corners, they are sometimes called fairy-purses. Seals are occasionally, but rarely, taken asleep under the cliffs. In the autumn of 1828, we had one for some weeks, and he became rather tame; but he could not bear the frost, and evidently pined for his own element. Whenever he could get loose, he made off straight for the sea, which is at the distance of nearly a mile; and to the sea, at length, to his great delight, we restored him. He was inclined to be sociable whilst with us; for, when left alone, he would creep into the kitchen for company: and he had a good appetite; for one night, after a hearty supper, he got out of his tub, and stole and swallowed twenty-six large herrings. Whales are not unknown on our coast. A small one got entangled on the rocks at Runton, on the 23d of November, and was killed. I saw it when cut in pieces, and, therefore, I cannot give so complete an account as I could desire; but I understood it was 24 ft. long. The whalebone fringe which lined the jaws was nearly white; the jaws 2 ft. 7. in. long; the extreme width of the tail, 3 ft. 11 in. I think it was the Balænóptera *B*òops described in p. 233. of the *British Naturalist*. Its nose was pointed, and it had the spout-holes in the middle of the head. Its colour was nearly black on the back, and below it was white, and in folds; the blubber was about 1½ in. in thickness, and produced very fine oil. A steak of the flesh was cooked, and tasted like tender beef. In March, 1822, a much larger whale, also of the *B*alæ̀na kind, was killed at Overstrand. You may like to have the dimensions: — Length, 57 ft.; breadth of tail, 13 ft.; pectoral fin, 6 ft. 6 in.; tongue in length, 9 ft.; in breadth, 4 ft. Another whale was observed spouting off Cromer in the autumn of that year.

Having referred to the *British Naturalist*, I must advert to the just regret of the author of that entertaining little work, at the extinction of the Urogállus, or cock of the wood, in Britain; and I would take this opportunity of mentioning, that, five years ago, a gentleman of this neighbourhood imported a pair of these birds from Sweden. They did well in confinement; and hatched seven young ones, which grew to the size of pheasants; but then they and their mother died, it was supposed, from exposure to the sun. The cock was turned out, and lived two years in the fir plantations; he was then killed accidentally. The gentleman who made the attempt intends to renew it, and has much expectation of final success.

I shall be glad if these facts be considered worthy of a place in your interesting Magazine. I am, Sir, yours, &c. — *A. G.* *Jan.* 5. 1830.

Norfolk and Norwich Museum. — The Fifth Annual Meeting of this Institution was held in the Society's Rooms, in Norwich, on Nov. 25., Dawson Turner, Esq., having taken the chair, addressed the subscribers to the following effect: —

"As this is the first opportunity which has been allowed me of meeting you, I trust that, before we proceed to the business of the day, I shall be permitted, for a few moments, to trespass upon your time, chiefly for the purpose of returning you my thanks for the honour you have done me in electing me to this chair. I do assure you that I very deeply feel, and very sensibly appreciate, the distinction thus bestowed upon me; for it is virtually nothing less than nominating me to be the head of the naturalists of this opulent, enlightened, and scientific county: and, when I speak of Norfolk as a county distinguished for the love and the pursuit of science, I am by no means using words of course, or wishing to flatter the self-love of you or my fellow-countrymen at the expense of truth. I do, indeed, feel that Norfolk is deserving of such an epithet. I remember, about thirty years ago, being in company with one of the most distinguished naturalists of Europe, and at the same time with a botanist from a distant part of England, who had been upon a visit in Norfolk. The former, congratulating the other upon what he had seen and gathered, observed that there must of necessity be some singular advantage in the soil, the climate, or the position of Norfolk, which made it so celebrated as abounding in the rarer productions of nature; and was not a little astonished when told that, on the contrary, Norfolk was one of the districts of England the least favoured in those respects, and that any preeminence she might enjoy was altogether owing to the industry and talents with which her resources had been investigated and developed. Such an assertion is certainly startling at first; but when I call to mind that, in the short space of my own life, I have known and associated with such men as Sir James Smith, Mr. Crowe, Mr. Woodward, Dr. Rigby, Mr. Whitear, Mr. Burrell, Mr. Bryant, Mr. Wegg, Dr. Hooker, Professor Lindley, and very many others whose names have at this moment escaped me, all of them natives of, or residents in, Norfolk, its probability will be easily admitted and its truth acknowledged. With regard to the value and importance of museums in general, I feel that it would be entirely out of place to attempt to enlarge upon a point so universally admitted and so fully appreciated by every gentleman present. As a centre of union for men of taste and science; as a receptacle for objects which would otherwise be neglected or dispersed or lost, or, if neither lost, dispersed, nor neglected, would be hidden in the obscurity of private houses; as the means of forming the minds of the young to pursuits the most worthy, by exciting their curiosity, and teaching them the value and the pleasure of mental cultivation; and as a most delightful source of information to men of every age, who hence acquire more exalted ideas of their Creator, and learn, more and more, to look through Nature up to Nature's God: in all these, and in many other respects, the value and the importance of museums are neither to be denied nor doubted. With respect to our own museum, in particular, I feel there is the strongest room for our self-congratulation. It is, indeed, an infant in years, but, in growth, it has attained a degree of maturity which is really surprising. When I look about me, and see the various objects of art and of nature with which I am surrounded, I cannot but be impressed with the greatest thankfulness, first to the extended patronage of the public; then to the numerous gentlemen who have favoured us with donations; and the last, not least, to the labour of the committee who have directed this establishment. In speaking of the exertions of this committee, it is not necessary for my expressions of gratitude to be checked by any false delicacy; for I cannot be supposed to be arrogating any merit to myself: I joined them only at the twelfth hour; in time, indeed, to see and to appreciate the value of their labours, but not to take a part in them. Indeed, during the last year or two, it might at first view be supposed that their labours had been, in a great degree, relaxed; for the committee had felt it their duty to abstain from making any purchases, or even from taking steps to display a considerable portion of what we possess, feeling it a paramount duty to apply themselves mainly to the extinction of the debt which, but two years ago, hung over us as an incubus, and threatened our destruction. This debt is now happily reduced from 400*l.* to little more than 50*l.*; and, in the course of two years, will, without any extraordinary effort, be altogether annihilated. The rather have I cause to congratulate you upon the present state of the Institution, which no one of us could have expected at its outset to have seen in the present flourishing condition; and of which I must be allowed to say, as the poet of the *Jerusalem Delivered* of his favourite hero, but

"L'età precorse e la speranza e i fiori
Presti furean, quando n' usciro i fioretti."

Again to advert to myself, I am the more flattered by the situation in which I am placed, inasmuch as I am the successor to one who was confessedly the first-rate naturalist, not only of Norfolk but of England, and not only of England but of Europe. With Sir James Smith I had the happiness of maintaining an uninterrupted friendship for thirty years; I esteemed and I loved him whilst alive; and, so long as I myself shall live, I never shall cease to dwell with affectionate regard upon his memory. Whether in public or in private life, Sir James Smith was a man who was highly estimated. His talents and his time were always devoted to the public, and always to doing good. By his works he has erected to himself an imperishable monument; and upon every occasion, in these works, he has uniformly studied to promote the happiness of mankind and the glory of God. As possessor of the Linnean Herbarium, his conduct was at all times eminently liberal, opening its treasures, without reserve, to men of every rank and station, and of every clime. As founder and president of the Society which equally bears the name of the great Linnæus, his amiable and condescending affability won him the regard of every member of that body, whilst that establishment gave a character and a permanency, and an importance to the study of natural history in England, which it could not otherwise have attained. While proud to be his successor, I feel how much I must suffer in comparison with such a man; but I will not pay you so ill a compliment as to dwell on my unworthiness to occupy his chair. It is sufficient for me that you have thought fit to elect me to it; and my endeavour shall not be wanting to discharge its duties. If, from want of talents or of leisure, or from the distance of my residence, I should be found inadequate to the satisfactory performance of what is imposed by the office, I shall confidently rely upon your indulgence, and upon the assistance of the committee, or shall resign into your hands the trust you have confided in me, with the same cheerfulness and thankfulness with which I, in the first instance, accepted it."

The accounts of the Society were read, and the committee for the year appointed. (*Norfolk Chronicle*, Nov. 28. 1829.)

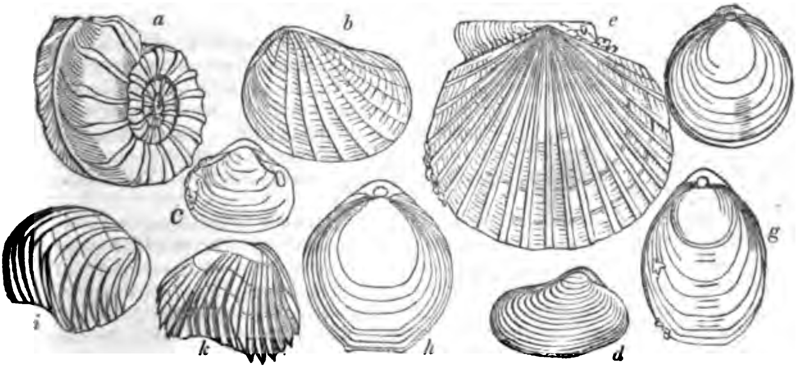
GLOUCESTERSHIRE.

Natural History Society. — A Society has been established at Gloucester, the enquiries of which are to be dedicated to subjects of natural history. Dr. Barron has accepted the office of president. (*Hereford Journal*, July 29.)

Fossil Remains from Foxcote. — In 1827, my employer had a well sunk on one of his farms, for the use of his cattle, upon those beautiful hills near Foxcote. It is 70 ft. in depth, and these stones (*fig.* 35.) came out of it, save one that was given me by a friend from Newland, and which was taken out of a gravel pit in that parish, near Shipston on Stour, Worcestershire. If you should find them useful, they are much at your service; and I remain, Sir, yours, &c. — *W. B. Rose, Gardener. Foxcote, Sept.* 6. 1829.

The fossils with which we have been favoured by Mr. W. B. Rose, have been submitted to the examination of Mr. J. D. C. Sowerby, who has communicated the following catalogue: —

35



a, Ammonites hawskeriénsis *Young and Bird.*
b, Pholadomya prodúcta *Min. Con.*
c, Vènus? A cast found also at Pickeridge Hill.
d, Amphidésma pholadifórmis *Phillips*, Yorkshire. Pullástra *Murchison, Geol. Trans.*
e, *Pécten* æquiválvis *Min. Con.*
f, Terebrátula orbiculàris (new species).
g, Terebrátula ovöìdes? *Min. Con.*
h, Terebrátula bìdens (new species).
i, Terebrátula mèdia *Min. Con.*
k, Terebrátula tetraèdra *Min. Con.*

The unfigured specimens are fragments of two species of Ammon*ites*; an impression, probably, of Am. planicósta, apparently from the lias; a fragment of a species of *Pécten*; Sérpula (imperfect), *B*elemnìtes, and Pentacrìnus; fragments of *G*ryphæ'a? *O'*strea? and *B*elemnìtes?

Without being able to point out the precise locality whence these fossils were collected by our correspondent, we have little hesitation in assigning them to the inferior oolite; and are probably correct in referring them to the brown, ferruginous, and micaceous sandstone which is situated near the lower part of the series, towards the lias, and in which the large *Pécten* æquiválvis is the most distinguishing shell. This bed appears to be the same as that described by Messrs. Coneybeare and Phillips, under the term "marly sandstone." Most of the fossils in the foregoing list will be found in that furnished by the authors of the *Outlines of the Geology of England and Wales.* Fine sections of this portion of the oolitic series occur in the western escarpment of the Coteswold Hills of Gloucestershire, and upon the detached or outlying hills which arise within the vales of Gloucester and Evesham. A sketch of this escarpment, sufficiently exhibiting the subdivisions of the strata, may be consulted at p. 252. of the work to which we have referred. The inspection of these fossils recalled to our memory an extraordinary assemblage of similar shells, evidently derived from the same matrix, in a quarry on one of those outlying masses of oolite to which we before alluded, in the same county. We revert to the circumstance, as interesting to ourselves, from early associations. It was the first occasion which attracted our attention to these singular depositories of organic remains, and excited an admiration which the experience of 23 years has only served to strengthen, at these wonderful records of a former world. The specimen of bone which Mr. Rose states was discovered near Shipston on Stour is a portion, probably about one third, of a large molar tooth of an elephant, comprising eight plates, forming the centre or middle part of the tooth. It occurred, as we are informed, in a bed of gravel about 10 ft. in depth. This is another instance of the extensive diffusion of the bones of elephants in the diluvium of our island. We thank Mr. Rose for this contribution, because it enables us to compare, to name, and to figure the specimens for the satisfaction of himself, and to the advantage of our geological readers. We are particularly desirous of encouraging similar communications from our country friends. — *R. C. T. Jan.* 1830.

WORCESTERSHIRE.

The Cuckoo. — The best place for observing the habits of this bird, in England, is on the range of the Malvern Hills, where they abound, in the season, in extraordinary numbers, making the whole circuit of them resound continually with their note, in a most striking manner; and flying about, from tree to tree, in a way which would much delight a person fond of natural history. The workmen of the neighbourhood say a bird comes with them, which they call the cuckoo's maid, but I never saw it. — *X. Y. Dec.* 25. 1829.

Plants on the Malvern Hills. — Sir, The Malvern Hills being so well known, from the beautiful prospects they afford, and being the resort of many persons in the summer season, incited, probably, as much by the salubrity of the air as the purity of the waters, perhaps the following list of plants growing on them, or in their vicinity (all gathered or observed by myself, in various excursions), may not be unacceptable. Several I have noted this present season, during a short residence in the neighbourhood for the benefit of my health.

Plants growing on, or in the immediate vicinity of, the primitive, granitic, and sienitic chain of the Malvern Hills, stretching nine miles in length from north to south, from Leigh Sinton in Worcestershire, to Bromsberrow in Gloucestershire; bounded on the east by the red marl plain of Worcestershire, and on the north and along the west by the transition limestone of Worcestershire and Herefordshire*: —

Enchanter's nightshade (*C*ircæ'*a* lutetiàna); blunt-fingered speedwell (*Verónica* triphýllus), at the northern extremity of the Link Common at the foot of the hills; butterwort (Pinguícula vulgàris), in a bog on the western side of the Worcestershire Beacon, but on no other part of the hills; gipsywort (Lycòpus europæ'us), in the neighbouring ditches; cotton-grass (*E*rióphorum polystàchion), in a bog on the western side of the hills; mat-grass (*N*árdus stricta), on the commons; silver hair-grass (*A*ira carophýllea); tall fescue grass (*Festùca* gigantèa); reed-fescue (*F.* calamària), the last two in woods on the limestone hills north of Malvern; water blinks (Móntia fontàna), in plashy rills on the hill; small teasel (*D*ipsacus pilòsus); woodroof (Aspérula odoràta); lady's mantle (*Alchemílla* vulgàris); holly (*I*'lex *A*quifòlium), almost covering one of the hills in the southern part of the chain; tufted water scorpion grass (*M*yosòtis cæspitòsa); gromwell (*L*ithospérmum officinàle); green-leaved hound's-tongue (*C*ynoglóssum sylváticum), in the woody glen at the foot of Warren Hill, near Little Malvern; bog pimpernel (*A*nagállis tenélla), mossy bog at the base of the Worcestershire Beacon; great mullein (*V*erbáscum *T*hápsus), in abundance; moth mullein (*V. B*lattària), side of the road to Worcester; thorn apple (*D*atùra Stramònium), on waste ground near the church; henbane (*H*yoscýamus niger), in abundance at the base of the hills near the wells; lesser periwinkle (*V*inca minor), in a wood on the summit of a limestone hill near Cradley; lesser dodder (*Cúscuta E*pithymum), on the north hill; autumnal gentian (*Gentiàna* Amarélla), on limestone, in a rocky wood near the Wytch, plentifully; creeping water-parsnep (Sìum rèpens), in marshy ground on the western side of the Worcestershire Beacon; mealy Guelder rose (*V*ibúrnum Lantàna), in the woods, on limestone, near Ledbury; flax (*L*ìnum usitatíssimum), near Little Malvern; sundew (Drósera rotundifòlia), bog on western side of the Beacon; snowdrop (Galánthus nivàlis), in great abundance in a mossy glen at the north-western base of the Herefordshire Beacon, and in the adjoining wood; daffodil (Narcíssus Pseùdo-narcíssus), in profusion in a wood near Little Malvern church, and some full-flowered varieties in other parts; wild tulip (*Tùlipa* sylvéstris), this was found among the limestone quarries by Jas. T. Goodman; golden dock (*R*ùmex palústris), marsh by the chalybeate spring; arrow grass (*T*riglòchin palústre), in boggy places; meadow saffron (*C*ólchicum autumnàle), abundant in the moist meadows on the western side of the hills; yellow-wort (Chlòra perfoliàta), near the limestone quarries; bilberry* (*V*accínium Myrtíllus), on the rocks of the Worcestershire Beacon; Ling (Callùna vulgàris), no other kind of heath grows throughout the whole range; great bistort (*P*olýgonum Bistórta), in moist copsy meadows to the north of the hills; alpine bistort (*P.* vivíparum); herb paris (Pàris quadrifòlia), in the thick woods at the western bases of the two beacons; golden saxifrage (Chrysosplènium oppositifòlium), abundant in the shallow plashy rills; Deptford pink (Diánthus Armèria); bog stitchwort (Stellària uliginòsa); purple sandwort (Arenària rùbra), abundant on the rocks; navelwort (*C*otylèdon umbilìcus), numerous in the fissures of the rocks; Sèdum *Telèphium*, *S.* àcre, and *S.* álbum, all abundant on the rocks of the north hill, but the álbum rarely flowering; smooth awl-shaped spurrey (Spérgula saginöìdes), in a marshy spot on the western side of the Worcestershire Beacon, about midway down the hill; also in another springy spot near the Wytch; wild service (*P*ỳrus torminàlis), in the woods; mountain ash (*P.* aucupària), numerous at the base of the north hill; *Spiræ̀a salicifòlia*, in an old, overgrown, half dried-up watercourse near Welland Common, at the base of the hills; but, perhaps, naturalised there, as a garden was not far from the spot; *R*òsa villòsa; *R.* tomentòsa; *R.* rubiginòsa, in some plenty on the limestone hills; *R.* micránthá, on the thickety side of the Warren Hill; *R.* Borrèr*i* and *R.* Forstèri, in the woods; Potentílla argéntea, plentiful on the rocks; P. vérna, on the rock above the cave on the Herefordshire Beacon; small-leaved lime (*T*ília parvifòlia), woods at the north end of the range; *C*ístus Heliánthemum; columbine (Aquilègia vulgàris); *R*anúnculus parviflòrus; *N*épeta Catària; spearmint (*Méntha* víridis), by the side of a stream near Newland; peppermint (*M. pi*perìta), plentiful by the rills on the chase; calamint (*Th*ỳmus *C*alamíntha), abundant; toothwort (Lathræ̀a squamària), at the base of the north hill, on the roots of holly, and in a thick wood on a conglomerate rock near the Tame, on the roots of maple; foxglove (Digitàlis purpùrea), in all parts of the range, profusely; *G*erànium lùcidum; *F*umària claviculàta; *A*nthýllis Vulneràrìa; *V*ícia sylvática, in the wood below the Worcestershire Beacon; *O*rníthopus perpusíllus; saintfoin (*Hed*ýsarum *O*nobrỳchis), on the limestone rocks; sulphur-coloured trefoil (*T*rifòlium ochroleùcum, on the Link Common; tutsan (*H*ypéricum *A*ndrosæ̀mum), in a wood near Little Malvern priory; upright St. John's wort (*H.* púlchrum), abundant on the heathy ground at the north base of the End Hill; wall hawkweed (*H*ieràcium muròrum), on the rocks; Carline thistle (Carlìna vulgàris); golden rod (Solidàgo Virgaúrea), on the rocks; chamomile (*A*nthemis nòbilis), abundant on the wet commons near the hills; butterfly orchis (*O.* bifòlia), in the woods; pyramidal orchis (*O.* pyramidàlis), on the limestone banks, varying with milk-white flowers; frog orchis (*O.* víridis), in pastures at the base of the north hill; aromatic orchis (*O.* conópsea), covering whole meadows at the foot of the northern limestone eminences; bee orchis (*O. a*pífera), on the limestone rocks at Leigh Sinton; ladies' traces (Neóttia spiràlis), on the wet commons; juniper (*J*uníperus commùnis), on the limestone rocks; yew (*T*áxus baccàta), abundant in the adjacent woods on limestone, various old and curiously grotesque individuals.

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* Perhaps, at a future time, I may say more on the geology of this district, if not anticipated by an abler correspondent.

Having thus enumerated so many flowering plants, I must defer mentioning any of the Cryptogàmia at present. I am, Sir, &c. — *Edwin Lees. Hunter's Hall, near Little Malvern, Sept.* 18. 1829.

Plants varying in the Colour of their Flowers, &c., growing wild principally near Worcester. — Red valerian (*Valeriàna* rùbra), on the walls of the Priory gate at Crickhowell, with white flowers, but plants with red flowers growing intermixed with the white ones. Spring crocus (*C*ròcus vérnus), with white flowers, in a low field on the south side of Worcester; soil alluvial, on red marl. Cowslip (Prímula vèris), with deep red flowers, in a gravelly field, on the west side of Worcester. Meadow saffron (*C*ólchicum autumnàle), with white flowers, in a meadow on the banks of the Severn, growing in company with purple ones. Common ling (Callùna vulgàris), with white flowers, in a boggy place on the western side of the Malvern Hills. Soapwort (Saponària officinàlis), with double flowers, in a hedge on the road to Cotheridge. Wild plum tree (*P*rùnus doméstica), with double flowers, in a hedge near Cruckbarrow Hill. Meadow-sweet (*S*piræ̀a Ulmària), a most beautiful variety, with full flowers, resembling small white roses, in a marshy place at Battenhall, on the road to Cruckbarrow Hill. Burnet rose (*R*òsa spinosíssima), the cream-coloured petals marked with red, Battenhall Lane, Worcester. White-clustered bramble (*R*ùbus leucóstachys), with double white flowers, in a hedge on the north side of Worcester. *R*ùbus glandulòsus, with red flowers, and the calyces in six segments, terminating in leafy points on Bromsgrove Licky. Dwarf cistus (*C*ístus Heliánthemum), with red flowers, in Lord Somers's park at Eastnor Castle; a straggling seedling, probably from the neighbouring limestone eminences, where the common yellow flowers flourish abundantly. Ground ivy (Glécoma hederàcea), with deep purple flowers, on red marl, in Battenhall Lane. Wood betony (*B*etónica officinàlis), with white flowers, in a copse on the Helbury Hill, west side of Worcester, towards the boundaries of the red marl and lias marl. Self-heal (*Prunélla* vulgàris), with white flowers, west side of Worcester, on gravel. Red bartsia (*B*ártsia *O*dontìtes), with white flowers, on limestone near Ledbury; eight or ten specimens with *white* flowers, growing within a yard's distance of numerous plants with *red* ones. Dwarf red rattle (*P*ediculàris sylvática), with white flowers, in a boggy meadow near Mudwall Mill, Worcester; a number of plants growing together, all with white flowers. Great snapdragon (*A*ntirrhìnum màjus), with cream-coloured flowers, on an old wall near the Commandery, Worcester. Foxglove (Digitàlis purpùrea), with white flowers, on the north hill at Malvern; an old inhabitant informed me that this white variety was many years ago almost as common on the hills as the purple one, but curious visitors having repeatedly rooted it up year after year wherever it appeared, it is now quite rare to find a white-flowered plant. Small-flowered cranesbill (Gerànium pusillum), with white flowers, Henwick hill, on sandy ground. Musk mallow (Málva moschàta), with white flowers, as a weed in a garden on Henwick Hill; a straggler from the wild ones with pink flowers, growing by the road-side. Milkwort (Polýgala vulgàris), with white flowers, on limestone, to the north of Malvern. Wood vetch (Vícia sylvática), with flowers entirely cream-coloured, on limestone, in the middle of the Lime-kiln Woods, near Wellington, Shropshire; some other plants, not far off, had their flowers of the usual variegation of blue, white, and grey. Musk Thistle (Cárduus nùtans), with white flowers, on Malvern Hills. Pyramidal orchis (O. pyramidàlis), with white flowers, on transition limestone, at the north-west base of the Malvern Hills. I am, Sir, &c. — *Edwin Lees. Hunter's Hall, near Little Malvern, Sept.* 17. 1829.

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* I mention the bilberry here, to correct an error of Dr. Walker's of Huddersfield, who, in a paper recently published in the *Midland Medical and Surgical Reporter*, states that no bog or alpine plants are found on the Malvern Hills, "*not even the* Vaccinium." Of course, it did not fall under Dr. Walker's observation; but he omitted to examine the rocks of the Worcestershire Beacon, where the *V*accínium Myrtíllus grows plentifully; and the bog on the west side of the Beacon also escaped his notice.

WARWICKSHIRE.

Weaver's Museum in Birmingham. — Richard Weaver, a working shoemaker, being in bad health, was advised to walk frequently into the country, and on these occasions amused himself with collecting various species of insects and especially the Lepidóptera, in their different stages. By making up small cases of butterflies for sale, he obtained a sufficient sum to purchase a cabinet, and is at length become possessed of one of the most complete collections out of the metropolis. At the suggestion of some friends, he is endeavouring to establish a museum here *, which at present he wishes to confine to the natural history of the British islands. He has a few British birds, but his means of obtaining a greater variety of specimens are extremely limited. Weaver has some subscribers of 1*l.* 1*s.* per annum, but still too few to defray the expenses of obtaining a larger collection; and, to aid his funds for this purpose, he will gladly make up small cases of British insects to order, either for sale, or in exchange for birds and other objects of natural history.

The character of Richard Weaver will be highly interesting to any of your readers, lovers of natural history, from the ardour he exhibits in the pursuit of his objects, apart from the consideration of pecuniary profit, beyond the most moderate maintenance of himself and his wife. He evinces great gratitude for any assistance afforded him either by instruction, specimens, or donations. It should be added, that Weaver has learned to set his butterflies with skill and effect. — *C. Birmingham, Nov.* 17. 1829.

Rarer Plants found in Warwickshire. — Sir, In making out, according to my promise, a list of the rarer plants of Warwickshire, the chief difficulty I have met with is that of selection; I mean, of determining, in many cases, what plants are of sufficient rarity to justify their insertion in the sort of list intended. And here I cannot help remarking, that in several instances the lists of rare plants and insects, furnished by some of your correspondents, from various parts of the country, consist principally of articles which have no pretensions to be so distinguished; and the publication of such lists in your Magazine, has accordingly drawn forth some severe, yet just, remarks from others, under the head of Retrospective Criticism. From the very nature of the case much difference of opinion, I am aware, must unavoidably exist on the subject. The occurrence of a plant in any particular district depends much on the nature of the soil, the presence or absence of a suitable *habitat*, or place of growth, of wood, mountain, heath, bog, water, waste ground, &c., and a variety of other circumstances. Some plants, too, though distributed very generally over a wide extent of country, are scarcely any where found in much abundance; while others are extremely local, yet where they do occur, sometimes occur in great profusion. As an instance of the former kind may be mentioned *S*amolus Valerándi, and, of the latter, *L*ithospérmum purpùreo-cærùleum, a plant which I never happened to have met with except in the neighbourhood of Chedder in Somersetshire, where the woods abounded with it to a great extent. The common Foxglove

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* No. 38. New Street, Birmingham.

(Digitàlis purpùrea), I have understood, would hardly find a place in the Flora of some English counties. In the immediate neighbourhood of this place I should in vain seek for a wild specimen of such common plants as *E*chium vulgàre, *C*ichòrium *I*'ntybus, *A*nthýllis Vulnerària, *E*uphórb*ia* amygdalöìdes, *S*álvia *V*erbenàca, *A*rtemísi*a* *A*bsínthium, and several others equally common, while the beautiful Campánula pátula[*], generally, and with reason, considered one of our rarer natives, occurs plentifully in this and many other parishes in the neighbourhood. No two botanists, therefore, it is probable, would exactly agree in their selection of the species proper to find a place in a list of the rarities of one and the same district. No doubt I have enumerated below some plants which others would have omitted, and excluded some which others would have been disposed to insert. In either case, the apology I have to plead is the difficulty of drawing the line.

> —— “ Non omnes eadem mirantur amantque.
> Quid dem? quid non dem? Renuis quod tu, jubet alter.” [†]

It is proper to state, that the following does not profess to be a complete list of all the rare plants which the county may afford; such only are mentioned as I have observed myself, or for which I have the authority of some personal friend; and, in the latter case, the authority for the insertion is always given. Yours, &c. — *W. T. Bree. Allesley Rectory, Aug.* 24. 1829.

Name.	*Place of Growth.*
Verónica scutellàta	Coleshill Heath.
montàna	Woods at Beausal, near Wedgnock Park.
Pinguícula vulgàris	Bog near Chemsley Wood, and Bannerley Pool, Coleshill.
Erióphorum vaginàtum	Bog below Coleshill Pool.
polystàchion	Packington, Countess of Aylesford.
*A*rúndo epigèjos	Allesley.
*D*ípsacus pilòsus	Banks of the Blithe, Coleshill; Bourne Brooke, Shustoke.
Sagìna erécta	Coleshill Heath.
Hottòn*ia* palústris	Between Coleshill and Tamworth.
*L*ysimàch*ia* vulgàris	Banks of the Blithe, Coleshill.
*A*nagállis cærùlea	Corn fields, Bidford.
tenélla	Bogs, Coleshill Heath, Sutton Park, &c.
Campánula pátula	Allesley, Meriden, Coleshill, &c.
latifòlia	Allesley.
hýbrida	Bidford.
*V*iola hírta	Bidford, Birdingbury.
palústris	Coleshill Heath, &c.
*V*erbáscum nìgrum	Stoneley.
*S*amòlus Valerándi	Itchington.
*R*hámnus cathárticus	Coleshill, Bidford, &c.
*V*ínca mìnor	Allesley, Fillongley.
Cúscuta europæ'a	Allesley.
*B*upleùrum rotundifòlium	Bidford, Wootton near Warwick.

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[*] I have been told that, some years ago, a noble lady, resident in this county, informed the celebrated Mr. Curtis that Campánula pátula was common in Warwickshire. As Her Ladyship was at that time only commencing the study of botany, Mr. Curtis seemed unwilling to credit the statement, and concluded that some other more common species had been mistaken for the one in question, assuring her, at the same time, that Campánula pátula was one of our rarest English plants.

[†] “ All do not admire and like the same things. . . . What should I supply? what reject? The same which you refuse, another orders.”

Scándix odoràta	Balsal Temple.
Pimpinélla mágna *	Allesley, Meriden, &c.
Sambùcus E'bulus	Grafton, Mr. Purton.
Parnássia palústris	Bogs, Coleshill, Warwick, &c.
Drósera rotundifòlia	Coleshill Heath.
Myosùrus mínimus	Coleshill.
Galánthus nivàlis	Packington, Countess of Aylesford.
Leucòjum æstìvum	Near the Avon, Stratford, Mr. Purton.
Tùlipa sylvéstris	Allesley.
Ornithógalum umbellàtum	Meadows near the Avon, Warwick.
Narthècium ossífragum	Bog below Coleshill Pool.
Convallària majàlis	Woods, Allesley and Corley; Bentley Park, Hay Wood.
Triglòchin palústre	Bogs, Coleshill.
Epilòbium angustifòlium	Ryton Wood.
Chlòra perfoliàta	Between Stratford and Alcester.
Vaccínium Oxycóccos	Pool in Chemsley Wood, Bog below Coleshill Pool, &c.
Dáphne Laurèola	Warwick, Itchington, &c.
Polýgonum Bistórta	Allesley, &c.
Pàris quadrifòlia	Bannerley Rough, Coleshill, Fillongley, &c.
Pýrola mèdia	Woods, Meriden.
Chrysosplènium alternifòlium	Balsal Temple.
Cotylèdon umbilìcus	Ruins of Maxstoke Priory.
Sèdum Telephìum	Woods, Allesley.
Cratæ'gus torminàlis	Claverdon.
Spiræ'a Filipéndula	Between Marton and Southam.
Ròsa tomentòsa †	Allesley, &c.
Donniàna	Allesley, Claverdon.
micrántha	Allesley, Bidford, &c.
sèpium ? ‡	Near Bidford Grange.
Potentílla argéntea	Coleshill Heath.

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* Judging from its frequent and abundant occurrence on banks and margins of fields in this neighbourhood, I should hardly have thought of introducing this plant into the above list. I find it, however, classed among our rarer species in Turner and Dillwyn's *Botanist's Guide*, and have heretofore been applied to by a botanist to forward roots to him from this neighbourhood into Yorkshire.

† Common enough in this county; I include it in the above list, not on account of its rarity, but because it is often overlooked or taken for a variety of Rósa canìna.

‡ This rose, which I discovered some years since in a rough pasture near Bidford Grange (see Purton's *Midland Flora*, vol. iii. p. 41.), and forwarded to the Horticultural Society, has, I understand, much perplexed the botanists connected with that establishment. If I might venture an opinion in a case where far better judges than myself entertain doubts, I should be disposed to consider this rose as merely a strong variety of Ròsa canìna. The difficulty, however, of determining the species of this genus is become almost proverbial: "Fungum et Rosam," says Scopoli, "quisque noscit, species vero genuinas utriusque generis ne botanici quidem consummati." ("Every one can tell a Fungus and a Rose; but to distinguish the true species of each is scarcely within the power of even a first-rate botanist.") I have been told of a justly celebrated botanist, and an able writer too on this very genus, who, being asked how many true species of rose he believed there were, replied somewhat dryly, "I really cannot say, but I am quite sure there is *one*."

Gèum rivàle	Arley Wood, &c.
Papàver Argemòne	Claverdon.
Aquilègia vulgàris	Woods, Allesley.
Ranúnculus parviflòrus	Bickenhill.
Hellèborus víridis	Dadley's Wood, Allesley; banks of Bourne Brook, Shustoke.
Méntha Pulègium	Allesley.
Galeópsis versícolor	Coleshill.
Scutellària mìnor	Coleshill.
Melampýrum arvénse	Packington, Countess of Aylesford.
Antirrhìnum spùrium	Bidford.
Limosélla aquática	Coleshill Pool, Countess of Aylesford.
Orobánche elàtior	Coleshill, Bickenhill, Allesley.
Teesdàlia nudicaúlis	Between Packington and Coleshill; between Coleshill and Lichfield, by the turnpike road.
Cardámine amàra	Allesley, Coleshill, Balsal Temple.
Turrìtis glàbra	Allesley.
Pelargònium sylváticum	Oversley Wood, Mr. Purton.
pyrenàicum	Allesley, Coleshill.
Genísta ánglica	Coleshill Heath.
Láthyrus A'phaca	Alne Hills, Mr. Purton.
Nissòlia	Coughton; Great Alne, Mr. Purton.
sylvéstris	Bubbenhall, near the bridge leading from Baginton.
Vícia sylvática	Bentley Park.
Astrágalus glycyphýllos	Bidford.
Hypéricum elòdes	Bog below Coleshill Pool, &c.
Lactùca viròsa	Stone bridge, between the Coleshill and Birmingham roads.
Hieràcium umbellàtum	Coleshill Heath.
Cnìcus erióphorus	Allesley, &c.
praténsis	Bog below Coleshill Pool.
Bìdens cérnua	Packington.
Tussilàgo hýbrida	Banks of the Avon, at Bidford Grange.
Solidàgo Virgaúrea	Kenilworth.
I'nula Helènium	Lower Whitacre.
O'rchis pyramidàlis	Ragley Park and Grafton, Mr. Purton.
Gymnadènia conópsea	Bogs, Coleshill.
Habenària víridis	Oversley Hill, Mr. Purton.
Listèra nìdus àvis	Kingsbury Wood, Mr. Boultbee, Bushy Wood.
Neóttia spiràlis	Bidford and Snitterfield, Mr. Purton.
Epipáctis latifòlia	Allesley, Coleshill, Wootton near Warwick.
palústris	Bogs, Coleshill, &c.
ensifòlia	Oversley Wood, Mr. Purton; Ragley.
Littorélla lacústris	Coleshill Pool.
Myriophýllum verticillàtum	Packington, Countess of Aylesford.
Quércus sessiliflòra *	Woods, Allesley; Hay Wood, &c.

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* This species has no claim to be considered rare in this, or perhaps in any other, part of the country; but except by the eye of a botanist it is seldom distinguished from the Quércus Ròbur. A writer in the *Quarterly Review* (No. lxxvii. p. 22.) states that Quércus sessiliflòra "is supposed to have been introduced, some two or three ages ago, from the Continent;" an opinion, which, I cannot help thinking, is ill-founded. That the acorns may have been imported from the Continent, as the reviewer states, and the plants raised from them extensively cultivated, is extremely probable. The species itself, however, I cannot but believe to be an original native of our island,

*S*àlix pentándra	Binley.
Osmúnd*a* regàlis	Coleshill Heath.
Botrýchium Lunària	Oversley Hill, Mr. Purton.
Lycopòdium clavàtum	Coleshill Heath.
inundàtum	Shores of Coleshill Pool.
*S*elàgo	Bog below Coleshill Pool.
Aspídium lobàtum*	Allesley, Meriden, &c.
Oreópteris	Coleshill Heath, &c.
*T*helýpteris	In a boggy pit, Allesley.
Pilulària globulífera	Coleshill Pool.
Tétraphis pellùcida	Allesley.
Trichóstomum fontinalöìdes	In the Avon at Warwick and Bidford.
Neckèr*a* heteromálla	Allesley.
*H*ýpnum lòreum	Woods, Allesley.
dendröìdes	Allesley, &c.
*a*lopecùrum	Allesley, &c.
*B*rỳum bícolor	Walls of Warwick Castle.
aúreum	Shores of Coleshill Pool.
*P*ezìza epidéndra	Allesley, Coleshill.
punìcea	Coleshill Heath.
Nidulària striàta	Allesley.
læ̀vis	Coleshill.
Reticulària Lycopérdon	Allesley, Coleshill.

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for the following reasons:— In some districts (e. g. in some parts of North Wales, and in the neighbourhood of the lakes in the north of England) it is the most prevailing kind, constituting, as it were, the staple growth of the country, almost to the exclusion of the other species, *Q. R*òbur. In these situations we should hardly suspect that the trees had been planted by the hand of man, nor have they that appearance; but, on the contrary, seem to be the spontaneous produce of the soil in which they grow. I have also observed, in various places, trees of the sessile-flowered oak, which, I should conclude, must be of some hundred years' growth. In this county, which formed a part of the woody and extensive district, anciently called the Forest of Arden, the oak in question is chiefly to be met with in woods, some of which almost entirely consist of this species, and exhibit evident marks of great antiquity, as well in other respects, as in the large hollow stools of oak which frequently occur in them. It is by no means an improbable supposition, that our Warwickshire woods may, at least in some instances, be portions of the original unreclaimed land, existing now in nearly the same state as before the country was cleared to its present extent for agricultural purposes. The reviewer, above referred to, very justly reprobates the practice of cultivating *Q*uércus sessiliflòra as a tree, on account of the comparative worthlessness of its timber. Where woods, however, are periodically cut, and chiefly employed as copse, and the oak poles (with the exception of such samplers as are left for timber) felled at about twenty years' growth for the use of the coal pits, the sessile-flowered oak, as being of quicker and cleaner growth, answers the purpose well, and is perhaps preferable to the other. So at least our woodmen would argue, who have a common saying among them, that "a quick ninepence is better than a slow shilling." I will only add, that this spurious species will attain to a very large size, and is extremely handsome in its foliage. As a timber tree, however, its culture cannot be recommended; and more especially ought the "impostor" to be extirpated from the royal forests and other woods which are to supply our navy.

* Very common in this county, but generally confounded with the nearly allied species, A. aculeàtum, from which, however, it is quite distinct. Ray's *Synopsis* may be usefully consulted on this fern.

Lycopérdon stellàtum	- Allesley, Coleshill, Warwick.
Sphæ`ria mammòsa	- Allesley.
Tríchia rubifórmis	- Allesley, Meriden.
Hýdnum membranàceum	- On an old moist bank, Coleshill.

LEICESTERSHIRE.

Plants in Charnwood Forest and its neighbourhood; the soil sienite and slate.

Grooby Pool (40 acres in extent), and its adjoining marshy and rocky banks.

- *Verónica* Anagállis.
  - scutellàta.
- Lycòpus europæ`us.
- I'ris Pseudácorus.
- Erióphorum polystàchion.
- Gàlium palústre.
  - saxátile.
- *Alchemílla* arvénsis.
- Mœ'nchia erécta.
- Menyánthes trifòliata.
- Lysimàchia Nummulària.
- Anagállis tenélla.
- Sìum angustifòlium.
- Œnánthe fistulòsa.
  - peucedanifòlia
- Hydrocótyle vulgària.
- Parnássia palústris.
- Bùtomus umbellàtus
- Saxífraga granulàta.
  - tridactylìtes.
- Scleránthus ánnuus.
- Arenària rùbra.
- Sèdum àcre.
- Spérgula nodòsa.
- Potentílla argéntea.
- Ranúnculus Flámmula.
- Thýmus Serpýllum.
- Scutellària galericulàta.
- Bártsia Odontìtes.
- Pediculàris palústris.
- Digitàlis purpùrea.
- Nastúrtium terréstre.
  - amphíbium.
- Eròdium cicutàrium.
- Málva moschàta.
- Genísta tinctòria.
- Onònis arvénsis.
- Trifòlium arvénse.
- Hypéricum quadrángulum.
- Eupatòrium cannábinum.
- Cnícus palústis.
  - erióphorus.
- Gnaphàlium uliginòsum.
  - germánicum.
  - mínimum.
- Senècio sylváticus.
  - aquáticus.
- I'nula dysentérica.
- O'rchis latifòlia.

Sheet hedges, and other woods adjoining Grooby Pool.

- Circæ`a lutetiàna.
- *Verónica* officinàlis.
- *Valeriàna* officinàlis.
  - dioíca.
- Aspérula odoràta.
- Lysimàchia némorum.
- Campánula latifòlia.
- Angélica sylvéstris.
- A'llium ursìnum.
- Hyacínthus nonscríptus.
- Dàphne Laurèola.
- Pàris quadrifòlia.
- Chrysosplènium oppositifòlium.
- Stellària Holóstea
- O'xalis Acetosélla.
- Potentílla Fragariástrum.
- Tormentílla officinàlis.
- Anemòne nemoròsa.
- Teùcrium Scorodònia.
- Galeóbdolon lùteum.
- Melampýrum praténse.
- Scrophulària nodòsa.
- Cardámine amàra.
- Vícia *Crácca.*
- Vicia sèpium.
- Láthyrus praténsis.
- O'robus tuberòsus.
- Hypéricum perforàtum.
  - hirsùtum.
- Hieràcium sabaúdum.
- Serrátula tinctòria.
- Mercuriàlis perénnis.
- Tàmus commùnis.
- Aspídium lobàtum.
  - dilatàtum.

Newtown Linford, adjoining Bradgate Park.

- Polýgonum Bistórta.
- Resèda Lutèola.

Bradgate Park and Ruins.

- Cynoglóssum officinàle.
- Hyoscýamus nìger.
- Chelidònium màjus.
- Antirrhìnum màjus.
- Méntha piperìta.
- Matricària Parthènium.
- Asplènium Rùta murària.

Ulvescroft Priory and neighbourhood.

- *Verónica* montàna.
- Adóxa Moschatéllina.
- Stellària uliginòsa.
- Pediculàris sylvática.
- *Alchemílla* vulgàris.
- Genísta ánglica.
- Pelargònium lùcidum.
- Artemísia vulgàris.
- O'rchis bifòlia.
- Equisètum fluviátile.
- Aspídium aculeàtum.
- Blèchnum boreàle.

Beacon Hill.

- Móntia fontàna.
- Callùna vulgàris.
- Erìca Tétralix.
  - cinèrea.
- Scutellària mìnor.
- Sàlix rèpens.
- Hypéricum pùlchrum.

Bardon Hill.

- Vìola palústris.
- Fumària claviculàta.
- Carlìna vulgàris.

Swithland Slate Pits.

- Lycópsis arvénsis.
- Jasiòne montàna.
- Cotylèdon umbilìcus.
- Teesdàlia nudicaúlis.
- Prenánthes muràlis.
- Aspídium Fìlix fémina.
- Asplènium Trichómanes.

Ruins and neighbourhood of Gracedieu Nunnery, at the northern extremity of Charnwood Forest; soil carboniferous limestone.

- E`chium vulgàre.
- Verbáscum Thápsus.
- A'tropa *Belladónna.*
- Népeta Catària.
- Stàchys palústris.
- Antirrhìnum Linària.
- Erígeron àcre.
- Sónchus palústris.
- Cárduus nùtans.

Also in Charnwood Forest.

- Vaccínium Myrtíllus.
- Hieràcium sylváticum.
- Sanícula europæ`a.
- Asplènium Adiántum nìgrum.

Glenfield and its vicinity, to the south of Charnwood Forest.

- Gàlium Mollùgo.
- Lithospérmum officinàle.
  - arvénse.
- Sýmphytum officinàle.
- Verbáscum nìgrum.
- Vìnca mìnor.
- Erythræ`a Centaúrium.
- Sìum nodiflòrum.
  - angustifòlium.
- Cnìdium Sìlàus.
- Pastinàca satìva.
- Daúcus *Caròta.*
- Lìnum cathárticum.
- Rùmex palústris.
- Arenària trinérvis.
- Spérgula arvénsis.
- Lýthrum Salicària.
- Agrimònia Eupatòria.
- Ranúnculus Lìngua.
  - parviflòrus.
- Thalíctrum flàvum.
- Sisýmbrium Sophìa
- Polýgala vulgàris.
- E'rvum hirsùtum.
  - tetraspérmum.
- Lòtus màjor.
- Trifòlium officinàle.
- Tragopògon praténse.
- Bìdens tripartìta.
- Tanacètum vulgàris.
- Achillèa Ptármica.
- O'rchis conópsea.
  - maculàta.
- Listèra ovàta.
- Euphórbia exígua.
- Hùmulus Lùpulus.
- Equisètum limòsum.
  - palústre.
- Ophioglóssum vulgàtum.

The foregoing list is chiefly taken from a little work lately published at Leicester, entitled, "A Guide to Bragdate Park, Ulvescroft Priory, &c., with a Short Account of the Natural History of Charnwood Forest;" with some additional plants lately discovered by myself. — *Andrew Blossom. Glenfield, near Leicester, Sept.* 1829.

Lysimàchia thyrsiflòra. — This plant is to be met with in great plenty at Leckby Carr, near Boroughbridge, in this county, along with Scheuchzèria palústris, Rhinchóspora álba, *V*accínium Oxycóccus, Drósera rotundifòlia and ánglica, Cómarum palústre, and other rare plants. — *H. D. Richmond, Yorkshire, Nov.* 24. 1829.

Early-flowering Plants growing in the Neighbourhood of Richmond. — Sir, I have found many of the plants mentioned in the following list earlier; but as these were generally solitary specimens, peculiarly situated, I have given their usual time of coming into flower. I have selected the same plants, with one or two exceptions, which your correspondent, Mr. George Banks, has, with a view to their more easy comparison. I am, Sir, &c. — *L. E. O. Richmond, Aug.* 1. 1829.

January.
Dáphne Lauréola,
Làmium purpùreum.
Stellària mèdia.
Prímula vulgàris (*Feb.*).
Potentílla fragarioìdes.

February.
Hellèborus víridis.
Tussilàgo Fàrfara.
Dràba vérna.
U'lex europæ'a.

March.
Fragària vésca.
Viola hírta.
Anemòne nemoròsa.
April.
Ribes Grossulària.
A'rabis Thaliàna.
Cochleària officinàlis.
O'xalis Acetosélla.
Viola canìna.
palústris (*May*).
Ranúnculus hederàceus.

Prùnus spinòsa.
insitítia.
Prímula elàtior.
vèris.
Fèdia olitòria.
Stellària *Holóstea.*
Vaccínium Myrtíllus.
May.
Prùnus *Cérasus.*
Fráxinus excélsior.
Barbarèa vulgàris.
Sherárdia arvénsis.

YORKSHIRE.

Rare Plants in the Neighbourhood of Richmond, Yorkshire. — Sir, Hoping that the following list of some of the rarer plants that I have met with in this neighbourhood will not be altogether devoid of interest to some of your readers, I have sent it to you. I have also sent the habitats, which you can either insert or leave out, if you think they will occupy too much space. I am, Sir, &c. — *L. E. O. Richmond, Nov.* 23. 1828.

Chàra híspida. Kirby, Fleetham.
flèxilis. Ditch near Coatham.
Salicórnia herbàcea Tees Mouth.
procúmbens. Tees Mouth.
Verónica scutellàta. Nun Monkton, near York.
montàna. Wood near Richmond.
Pinguícula vulgàris. Skeeby, near Richmond.
Utriculària vulgàris. Skern, near Darlington.
Lémna polyrrhìza. Pond near Nun Monkton.
Clàdium germánicum. Hell Kettles, near Croft.
Rhynchóspora álba. Leckby Carr, near Boroughbridge.
Scírpus pauciflòrus. Skern, near Darlington.
Erióphorum vaginàtum. Bog near Richmond.
Avèna praténsis. Near Kirby Fleetham.
Arúndo Calamagróstis. Wood near Richmond.
Lòlium temuléntum. Near Hartlepool.
Hórdeum marítimum. Redcar.
Tríticum júnceum. Redcar.
Dípsacus sylvéstris. Leven Bridge.
pilòsus. Wood near Richmond.
Potamogèton flùitans. Near Darlington.
compréssum. Near Darlington.
pectinàtum. Near Darlington.
lùcens. Near York.
Anchùsa sempervìrens. Spennithorne.
Prímula elàtior. Common near Richmond.
farinòsa. Marsh near Skeeby.
Menyánthes trifoliàta. Scorton.
Hottònia palústris. Near Thirsk.
Lysimàchia vulgàris. Near Malton.
thyrsiflòra. Leckby Carr.
Lysimàchia Nummulària. Near Scorton.
Campánula latifòlia. Woods.
Viola palústris. Bog near Richmond.
lùtea. Race-ground near Richmond.
A'tropa *Belladónna.* Kirby Fleetham.
Samòlus Valerándi. Baydales, near Darlington.
Rhámnus cathárticus. Skeeby.
Euónymus europæ'us. Wood near Richmond.
Ribes rùbrum. Wood near Richmond.
alpìnum. Wood near Richmond.
petræ'um. Wood near Richmond.
Œnánthe fistulòsa. Hell Kettles, near Croft.
pimpinelloìdes. Hartlepool.
Cicùta viròsa. Near Northallerton.
A'pium gravèolens. Ditch near Coatham.
Pimpinélla mágna. Near Thirsk.
Parnássia palústris. Field near Richmond.
Státice Armèria. Tees Mouth.
Limònium. Tees Mouth.
Drósera ánglica. Leckby Carr.
rotundifòlia. Leckby Carr.
Myosùrus mínimus. Near Darlington.
A'llium arenàrium. Near Nun Monkton.
Ornithógalum lùteum. Near Richmond.
Júncus cœnòsus. Tees Mouth. Var. 2 in. high.
Lùzula congésta. Moor near Richmond.
Scheuchzèria palústris. Leckby Carr.
Triglòchin marítimum. Tees Mouth.
Cólchicum autumnàle. Field near Richmond.
Epilòbium angustifòlium. By the Swale, near Richmond.

Vaccínium Oxycóccus. Leckby Carr.
Dáphne *Mezèreum.* On an island in the Swale, now perfectly wild.
Polýgonum vivíparum. Wensleydale.
Pýrola minor. Aske Woods.
Saxífraga umbròsa. Aske Woods.
Hírculus. Junction of Balder and Blackbeck.
tridactylìtes. Walls.
hypnöìdes. Wensleydale.
Chrysosplènium alternifòlium. Wood near Richmond.
oppositifòlium. Wood near Richmond.
Diánthus Caryophýllus. Fountain's Abbey.
Stellària nemoròsa. Wood near Richmond.
Arenària peploìdes. Redcar.
marìna. Redcar.
rùbra. Hartlepool.
Lýthrum Salicària. Near Skeeby.
Spiræ̀a Filipéndula. Malton.
Ròsa rubélla. Hartlepool.
Rùbus saxátilis. Richmond.
Potentílla fruticòsa. Wynch Bridge.
vérna. Wynch Bridge.
Cómarum palústre. Leckby Carr.
Actæ̀a spicàta. Askrigg.
Nymphæ̀a álba. Near Thirsk.
Aquilègia vulgáris. Near Wensley.
Thalíctrum mìnus. Near Coatham.
flàvum. Near Northallerton.
Ranúnculus Língua. Near Northallerton.
Tróllius europæ̀us. Near Richmond.
Hellèborus víridis. Kirby Flectham.
Teùcrium Scórdium. Bolton.
Méntha rùbra. Bishop Auckland.
Stàchys palústris. Near Richmond.
Scutellària minor. Near Walsingham.
Lathræ̀a squamària. Woods near Richmond.
Lepìdium latifòlium. Near Coatham.
Cardámine amàra. Richmond.
Nastúrtium amphíbium. Near Thirsk.
Hésperis matronàlis. Clover-field near Kirby Fleetham.
Pelargònium phæ̀um. Aske Woods.
Pelargònium sylváticum. Woods.
lùcidum. Walls.
columbìnum. Thirsk.
sanguíneum. Hartlepool.
Vícia sylvática. Woods.
Astrágalus hypoglóttis. Yorkshire Wolds.
Hypéricum humifùsum. Near Scotton.
Cárduus tenuiflòrus. Redcar.
heterophýllus Richmond.
Carlìna vulgàris. Richmond.
Bìdens cérnua. Bolton.
tripartìta. Bolton.
Artemísia gállica. Redcar.
marítima. Redcar.
Gnaphàlium dioícum. Race-ground near Richmond.
O'rchis bifòlia. Near Richmond.
pyramidàlis. Wensleydale.
mòrio. Near Richmond. — Also *O.* ustulàta, víridis, latifòlia, and conópsea.
O'phrys apífera. Near Wansley.
Listèra ovàta. Near Richmond.
cordàta. Near Richmond.
nìdus àvis. Near Richmond.
Epipáctis latifòlia. Near Richmond.
palústris. Near Richmond.
Spargànium símplex. Near Northallerton.
Càrex péndula. Near Richmond.
Myriophýllum verticillàtum. Near Bolton.
Sagittària sagittifòlia. Near Northallerton.
Sàlix triándra. Near Darlington.
amygdálina. Near Darlington.
rùbra. Near Darlington.
pentándra. Near Richmond.
frágilis. Near Richmond.
Lambertiàna. Near Richmond.
Polypòdium Dryópteris. Near Gilling.
Aspídium lobàtum. Near Redcar.
Cyathèa frágilis. Malham.
Asplènium víride. Malham Farm.
marìnum. Near Hartlepool.
Woódsia ilvénsis. Falcon Clints.
Lycopòdium selaginöìdes.

The following is a list of the white varieties found in this neighbourhood, in the class Didynàmia alone: —

A'juga réptans.
Betónica officinàlis.
Ballòta nìgra
Clinopòdium vulgàre.
Orìganum vulgàre.
Prunélla vulgàris.
Bártsia Odontìtes.
Pediculàris palústris.

NORTHUMBERLAND AND DURHAM.

Natural History Society of Newcastle upon Tyne. — An introductory address delivered by the Rev. William Turner, at the First Meeting of the Natural History Society of the counties of Northumberland, Durham, and Newcastle upon Tyne, held on Tuesday, Sept. 15. 1829; to which are appended the provisional laws directed by the Meeting to be prepared by the Committee, and to continue in force until the Anniversary, and a list of the officers and members (Newcastle, 1829, pamph. 8vo); has been lately published. Theory would lead us to infer that literature and science should flourish most in cities and places which are the resort of those classes of society which have leisure and education; but, practically, it is otherwise. Cathedral cities and watering-places are remarkably deficient in the institutions which favour their progress, while commercial places have displayed an eminent zeal on the subject. Newcastle was among the first to establish a Literary and Philosophical Institution, and has become the metropolis of science for the northern portions of England. Liverpool is indebted to a Roscoe, for engrafting upon its commercial stock a taste for the Muses and for literature; and Newcastle upon Tyne owes no less a debt of gratitude to Mr. Turner and others, for giving a salutary direction to the scientific occupations of the citizens, and infusing a noble spirit among its enterprising merchants.

Out of the Literary and Philosophical Institution has sprung a Natural

History Society for the counties of Northumberland and Durham, and Newcastle, as the child, when nurtured and matured, emancipates itself from its parent. It has to boast of a very superior collection (see Vol. II. p. 270.), especially of birds, which formed the Allan Museum, well known to naturalists, and which was purchased on very liberal terms by the assistance of one of the members. It is gratifying to witness that the ornithological school of the North, so long celebrated by the instrumentality of Bewick, continues to produce so many excellent and intelligent disciples; and, what is of more importance, that the commercial enterprise of a great and prosperous neighbourhood does not extinguish a generous ardour for science, nor quench the intellect in the love of gain. — ☞

The Third Meeting of this Society was held on Nov. 17th, John Buddle, Esq. in the chair. The attendance was thin. Mr. Winch read a paper from the Hon. H. T. Liddell, containing some description of a Honey Buzzard (Fálco *a*pivorus *Lin.*) lately shot by his keeper at Eslington, and which he characterised as a remarkably scarce British bird. The hon. gent. said he had only met with accounts of three specimens of it among all the ornithologists whom he had consulted. Mr. Bewick has an engraving of it, but both that and his description are essentially different in many points of marking and configuration from Mr. Liddell's specimen. The latter bird was killed while pursuing a wood pigeon, and was so very fat that the grease trickled down its side from the shot wounds: it is an adult bird, and was in the moult when shot. The collection of plants from New South Wales, presented by Mr. Taylor, and announced last month, was exhibited, having been carefully mounted by Mr. Winch. It was resolved, in the course of the evening, that a subcommittee should be formed to consider the best mode of applying to the mineral interest of the country for specimens, &c., of that peculiar and interesting science; several gentlemen were named for that purpose; and on the motion of the Rev. Wm. Turner, who said that a very useful officer was attached to the committees of the kind in Scotland, called a convener, Mr. Crawhall was requested to take that situation, and call them together when necessary, which he did. A sketch of a set of mineralised trees, which were found embedded in sandstone in a coal vein at Ruffside, was sent by Mr. J. Dolphin of that place. It gave rise to considerable discussion between the Chairman and other gentlemen around him, but the proceedings on this subject were nearly all of so technical and conversational a character, that any attempt at detail would be difficult. A few new members were proposed. (*Newcastle Courant*, Nov. 21. 1821.)

LANCASHIRE.

A Collection of Shells from Preston. — Sir, I send you a few shells of the following species: — *B*úccinum undàtum and anglicànum, *P*úrpura Lapíllus, Trìto*n* mácula, *M*ùrex *e*rinàceus, Fùsus bámffius *Fleming*, Turritélla térebra *Fleming*, Túrbo littòreus, Cárdium *e*chinàtum and edùle, Vènu*s* gallìna, Cyprì*na* islándica, Psammòbia feronénsis, Máctra sólida, Dentàlium striàtum and entàlis, which I beg your acceptance of. Part of them were obtained in a gravel pit, near Whittle Hills six miles south of this town, at an elevation of 300 ft. above the sea; the others have been collected, at different places, from the marl which covers nearly the whole country, from the shore at Blackpool to the foot of the mountains, a distance of at least twenty miles. From the elevated situation in which these shells are found, it is not probable that they have been laid there at any time since the deluge; but an attentive examination of the districts of the whole country can alone enable us to form a correct opinion as to the period at which they were deposited. Whenever that may have been, or whatever change may have taken place in the climate or temperature of this part of the earth, they prove, beyond dispute, by their perfect identity with the shells now found on our shores, that no perceptible change has taken place in these species of animals since that time. The surface of the whole kingdom being likely soon to be intersected and exposed by the cutting of rail-roads, every geologist must be anxious that such an opportunity of examining the effects of the deluge on the surface of our country should not be suffered to pass unimproved; and if the Geological Society of London would only encourage and direct the efforts of ardent individuals in the country, they would obtain that accurate and extended information on the subject which such an opportunity and such aid can alone afford. I am, Sir, &c. — *Wm. Gilbertson. Preston, Dec.* 10. 1829.

These shells are so perfectly like those recently cast upon our shores, that we feel doubts as to their being any other. They might have been conveyed upon the soil for the purpose of manure. At all events, we should like to be informed further respecting those which are stated to occur in gravel at the height of 300 ft. The characters of the stratum in which they were embedded, its extent and thickness, and other geological data, are requisite to form a correct opinion of this deposit. — *R. C. T.*

Since the above note was written, we have procured some further information. The existence of shells, particularly Túrbo térebra, among the gravel employed in mending the road betwixt Whittle and Leyland, has long been known. One gravel pit, situated about three fourths of a mile from the canal at Whittle, is 20 or 30 ft. deep, several acres in extent, and upon higher ground than the canal, which is there 307 ft. above the level of the sea. Among this gravel several of the shells were obtained; and in two other gravel pits, about half a mile distant, similar shells were abundantly collected. They were deposited most plentifully in a layer at the bottom, or about 25 ft. from the surface. A considerable number have been obtained in sinking wells at Preston; others were procured from the marl, in cutting the new road to Blackburn at Brockhales Brow. The depth of this cutting is about 35 ft., of which 30 are marl and 3 or 4 of clay. A quantity of shells was easily procured from the lowest *lift* in the marl, and more may readily be collected at the same spot, before the marl is covered with vegetation. At Goosnargh is an extensive marling, where the shells are only indicated by fragments, because the marl is there only excavated to the depth of 12 ft. At Blackpool, where a perpendicular face of the same marl is exposed by the encroachments of the sea, several different species of shells, similar to those near Preston, may be obtained at depths of from 10 to 40 ft. These were embedded in, and filled with, marl, in a manner that nothing but a contemporaneous origin could have effected. They do not appear to be accompanied by any other organic remains, except such as are found in the mountain limestone pebbles. Their appearance is much more like that of recent beach shells than the *Suffolk Crag*, our most modern deposit, as we have been accustomed to consider, in this country. — *R. C. T.*

CUMBERLAND.

Leìstus montànus (*Mountain Leistus*). — The only recorded locality of this rare beetle is Skiddaw, and even there it is sparingly found. The most productive situation is the sudden ascent to the highest point or level of the mountain, after crossing the long and grassy level in the horse-path ascent. The insects are found under not very large fragments of the rock lying on bare sand and soddened soil, but rarely under those resting on vegetation or other stones. Last July, in a diameter of thirty or forty yards at this place, I took twelve specimens, one or two quite in the horse-path. On the summit of the mountain, where this beetle is generally sought for, I only captured three, although engaged there a longer time. The capture of these fifteen specimens was the work of three days. Two other entomologists took five between them at the summit of the mountain. Stephens, the only author who mentions this species, records the capture of thirteen by himself and others. —*H. C. W.* *Edinburgh, October*, 1829.

Birds in the Neighbourhood of Whitehaven. — Sir, In looking over my communication (Vol. II. p. 275.), I find I have omitted the *M*érgus serràtor, the Redbreasted Merganser, very rare; *C*olýmbus minùtus, the Little Grebe; and *A*nas *G*laúcion, the Morillon Duck, rare. In continuation, we have of the

Grállæ.

A'rdea màjor, Heron.
  stellàris, Bittern. Rare.
Scólopax arquàta, Curlew.
  rustícola, Woodcock.
  Gallinàgo, Snipe.
  Gallínula, Jack Snipe.
  Cálidris, Redshank.
Scólopax *Tótanus*, Spotted Redshank. Rare.
  Ægocéphala, Common Godwit. Very rare.
Trínga Vanéllus, Lapwing.
  Squataróla, Grey Plover. Very rare.
Charàdrius Morinéllus, Dotterel. Rare.
Charàdrius pluviàlis, Golden Plover.
Hæmátopus ostrálegus, Pied Oyster-catcher.
Fùlica chlóropus, Moorhen.
  àtra, Coot.
Rállus Créx, Corncrake.
  aquáticus, Water Rail.

Gallinæ.

*T*étrao scóticus, Red Grouse.
*P*érdix, Partridge.
*Cot*úrnix, Quail. Rare.

Pásseres.

*Col*úmba *Œ*̀nas, Stockdove.
*Pa*lúmbus, Ringdove.
*A*laúda arvénsis, Skylark. A white specimen is sometimes, though rarely, seen.
obscùra, Rocklark.
*St*úrnus vulgàris, Starling.
*C*inclus, Water Ouzel.
*T*úrdus viscívorus, Missel Thrush. Scarce.
pilàris, Fieldfare.
íliacus, Redwing.
mùsicus, Throstle.
*M*érula, Blackbird. A piebald variety is generally to be met with in the woods of Irton Hall, although few in number.
Lóxia curviróstra, Crossbill. Very rare.
*Py*rrhùla, Bullfinch.
*C*hlòris, Greenfinch.
Emberìza *M*iliària, Corn Bunting.
Citrinélla, Yellowhammer.
*F*ringílla cœ̀lebs, Chaffinch.
Montifringílla, Mountain-finch.
*C*arduèlis, Goldfinch.
Linòta, Linnet.
Linària, Lesser Redpole.
doméstica, Sparrow.
*M*otacílla modulàris, Wood Sparrow.
Sýlvia, Whitethroat.
*M*otacílla álba, White Wagtail
flàva, Yellow Wagtail.
*Œ*nánthe, Wheatear.
Rubètra, Whinchat.
Rubícola, Stonechat.
Atricapílla, Blackcap.
Rubécola, Redbreast.
Troglódytes, Wren.
*R*égulus, Golden-crested Wren.
Boárula, Grey Wagtail.
*P*àrus màjor, Great Titmouse.
cærùleus, Blue Titmouse.
caudàtus, Long-tailed Titmouse. Scarce.
*H*irúndo rústica, Swallow.
ripària, Sand Marten.
Àpus, Swift.
*C*aprimúlgus europæ̀us, Goatsucker.

A very few additional species might probably be added to the above list, but as their identity depends on the observation and authority of others, which, in most cases, I find defective, I have omitted them, thinking it better to confine myself to those I have actually seen or possess, than to run the slightest risk of inserting any to which the least doubt attaches. In a future communication I will send you a list of the shells, Crustàcea, Mollúsca, &c., found on the coast of this county; till when, I remain, Sir, &c. — *J. Stanley, M.D. Whitehaven, July* 18. 1829.

Notice of the Arrival of Twenty-four of the Summer Birds of Passage in the Neighbourhood of Carlisle, during the Year 1829, with Observations, &c.*

No.	English Specific Names.	Latin Generic and Specific Names.	When first observed.
1.	Quail	*C*otúrnix vulgàris	May 23
2.	Swallow	*H*irúndo rústica	April 9
3.	House Marten	úrbica	—— 27
4.	Sand or River Marten	ripària	—— 5
5.	Swift	*C*ýpselus *A*̀pus	—— 27
6.	Goatsucker	*C*aprimúlgus europæ̀us	May 12
7.	Pied Flycatcher, male	Muscícapa Atricapílla	April 17
	female	——	—— 27
8.	Spotted Flycatcher	*Grísola*	May 12
9.	Wheatear	Saxícola *Œ*nánthe	April 12
10.	Whinchat	Rubètra	May 3
11.	Redstart, male	Sýlvia *P*hœnicùrus	April 17
	female	——	—— 30
12.	Grasshopper Warbler	*C*urrùca Locustélla	—— 18
13.	Sedge Warbler	salicària	—— 28
14.	Greater Pettychaps	horténsis	May 9
15.	Wood Wren	sibilàtrix	—— 6
16.	Blackcap	Atricapílla	April 25
17.	Whitethroat	Sýlvia	—— 29
18.	Yellow Wren	*R*égulus *T*róchilus	—— 15
19.	Yellow Wagtail	*M*otacílla flàva	—— 17
20.	Field Lark, or Titling	*A*'nthus triviàlis	—— 18
21.	Cuckoo	Cùculus canòrus	—— 26
22.	Wryneck	*Y*únx Torquìlla	—— 18
23.	Corncrake	*O*rtygomètra *C*réx	—— 18
24.	Common Tern	Stérna *H*irúndo	May 6

Quail. This bird may be considered scarce in the neighbourhood of Carlisle, and we believe is generally so throughout the county. It is, however, much more plentiful some years than others. This was the case last year, having heard it repeatedly in various situations; yet during the present summer we have not been able to detect its singular note either before or since the 23d of May. One or two are almost annually killed in the autumnal months, and a few have been known to remain over the winter.

Swallow. The appearance of the swallow this year was remarkably early, particularly so, considering the severe weather that prevailed at the time of its arrival, and is, we have reason to believe, the earliest notice of its having been seen in this neighbourhood. We first observed it between two and three P. M. coursing the river Eden in a sheltered situation near Etterby, in company with eight or ten sand-martens; and on our return the following day, it was still in the same situation. Although daily upon the look-out, we could not see another until the 21st, on which day several were seen.

Pied Flycatcher. All the writers upon British ornithology who have stated that this species is indigenous to Britain, appear to have done so more from conjecture than from any conclusive evidence, as we cannot find a single well authenticated fact of its having been met with in this country during the winter season; indeed, all the testimony upon which any reliance can be placed is decidedly against the supposition that it is indigenous, and tends strongly to prove that it is only a summer bird of passage. For instance, Mr. Bolton, in his *Harmònia Ruràlis*, says that it visits the west riding of Yorkshire, and departs with its young in September. The Rev. Mr. Dalton, of Copgrove (also in the west riding of Yorkshire), states that he has frequently seen it about his house in the summer, but does not recollect ever to have noticed it in the winter.* Dr. Heysham, in his *Catalogue of Cumberland Animals*, observes that the pied flycatcher appears about the same time as the spotted, but is not so common; and for the last three years we have noticed it regularly during the spring and summer in Cumberland, but as yet have never been able to see, hear of, or procure a single specimen in the winter, notwithstanding we have repeatedly searched for it in all the winter months during the above period; nor can we find, from the enquiries we have made, that it has ever been seen at this season of the year in those parts of Westmoreland where it constantly resorts to in great numbers.

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* First published in the *Philosophical Magazine*, and here republished at the request of th author, with some corrections and additions. — *Cond.*

The migration of this species appears to be principally confined to the northern counties, as it is seldom observed beyond Yorkshire, and rarely seen in the south of England, although it has occasionally been met with in Norfolk, Suffolk, Middlesex, Surrey, Dorsetshire; and Mr. Greaves, in his *British Ornithology*, states, that in the summer of 1812 he found a nest of this bird with young at Peckham, in Surrey. In some parts of Westmoreland it is very plentiful, especially in the beautiful and extensive woods surrounding Lowther Castle, the magnificent and princely residence of the Earl of Lonsdale, where we have seen it in very great numbers, and where it has bred unmolested and almost unknown for years. On the contrary, we have reason to think it has not resorted to the vicinity of Carlisle more than five or six years, and, as far as we have yet been able to ascertain, only to one locality, where it is evidently upon the increase.

In this situation the males generally arrive about the middle of April, the females not until ten or fifteen days afterwards: they commence nidification early in May, and the young are excluded about the first or second week in June. We have hitherto invariably found their nests in the hole of a tree, sometimes at a considerable height, occasionally near the surface of the ground, and, for two successive years, in the stump of a felled tree. In texture and formation the nest is very similar to those of the greater pettychaps, blackcap, and whitethroat, being only slightly put together, composed almost entirely of small fibrous roots and dried grass, always lined with a little hair, and generally a few decayed leaves on the outer side, but entirely without moss. Their eggs vary in number: we have found their nests with five, six, and now and then with seven; their colour a pale green, and so greatly resemble the eggs of the redstart, that it is frequently very difficult to distinguish them, unless contrasted together: they are, however, far from being so elegantly made, of a rounder form, and rather less, weighing from 23 to 30 grains.

The males, soon after their arrival, should the weather be at all favourable, will frequently sit for a considerable time on the decayed branch of a tree, constantly repeating their short, little varied, although far from unpleasing, song, every now and then interrupted by the pursuit and capture of some passing insect. Their alarm note is not very unlike the word *chuck*, which they commonly repeat two or three times when approached, and which readily leads to their detection. The manners and habits of the pied flycatcher have considerable affinity to those of the redstart; they arrive about the same time, associate together, and often build in the same holes, for which they will sometimes contend. On one occasion we found a dead female redstart in the nest of a pied flycatcher containing two eggs; and at another time, when both these species had nests within a few inches of each other, upon the redstart's being removed, the female redstart took forcible possession of the flycatcher's nest, incubated the eggs, and brought up the young.

We have now (August 26th) two young pied flycatchers, taken from the nest on the 21st of last June; and should we succeed in our attempts to domesticate them, we may, in all probability, on some future occasion, make a remark or two upon the change of their plumage from youth to maturity.

Wheatear. We were not able to see the wheatear before the 12th of April, and then only a solitary male, notwithstanding we had repeatedly traversed the coast for several miles in the latter end of March and the beginning of April; and it was not until the 17th that we observed them in the more immediate vicinity of Carlisle.

Grasshopper Warbler. The grasshopper warbler has been more abundant with us this year than usual; so much so, that we have been able to procure four specimens, and could have obtained more without much difficulty. These consisted of three males and one female: the plumage of the former nearly coincided with each other, but the female was entirely destitute of the brown spots on the breast, and all the under parts were of a uniform pale brown or buff colour. We have been induced to notice this circumstance, as it is stated that no material difference exists in the plumage of the sexes. Should this not be an accidental occurrence, it is possible the females do not acquire these marks until the second or third year.

The stomachs of the whole were entirely filled with the elytra and remains of small coleopterous insects, principally belonging to the family *C*urculionidæ of Leach; and we could not discover the least vestige of any orthopterous insect, upon which they are supposed almost entirely to subsist, and which they are said to decoy by their remarkable note.

Dotterel (*Charàdrius Morinéllus*). At one time we had considerable hopes that we should have been able to have noticed the arrival of the dotterel in this neighbourhood with some degree of accuracy, having lately ascertained that it had regularly for some years past resorted to some open ground contiguous to Scugh Dyke, situate upon Broad Field, about nine miles south-west from Carlisle. At this place they usually remained about ten days or a fortnight, when they in all probability took up their residence on Skiddaw and the adjoining mountains, where they annually breed. Early in May, 1828, they were seen in the above situation in considerable numbers, and from fifteen to twenty were killed about the 9th of that month. It is perhaps not very generally known that some parts of the plumage of the dotterel are in very great request by the manufacturers of artificial flies for fishing, which accounts for their being pursued and killed in such numbers; and it is probably owing to this circumstance that they are every year becoming more and more scarce in the vicinity of Keswick. We regret to add that not a single bird has been seen there this summer, which may partly be attributed to the numbers killed last year, and has, in all likelihood, caused them to resort to some more sequestered place. The eggs of the dotterel, we believe, still remain undescribed, which is somewhat extraordinary, considering that they constantly breed in the mountainous districts of Yorkshire, Westmoreland, Cumberland, and some parts of Scotland. Dr. Latham, it is true, in the last edition of his *General History of*

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* See the Supplement to Montagu's Ornithological Dictionary.

Birds, has given some account of the nest of this species, the time and period of their incubation, and the numbers of their eggs, but does not describe them. Under these circumstances, we trust the following description, although now written upwards of forty-four years ago, will not be altogether uninteresting to our ornithological readers: —

"Some time last summer a nest of the dottrel was found on Skiddaw; the old one was killed, and the eggs brought away, which were three or four in number. I saw three of them; they are somewhat larger than a magpie's egg, the ground is a dirty clay colour marked with large irregular black spots. February 14, 1785." *

Common Tern. This species does not visit Solway Frith in any great numbers, and for some years past has been much less numerous than usual. It is there called by the fishermen and others jerky, pickmaw, &c. The lesser tern (S. minùta) rarely visits the Frith, and Allonby is the nearest place we have lately received it from.

The spring of the present year was one of the most backward that has occurred in this neighbourhood for very many years.

During the whole of April and the beginning of May the thermometer was frequently below the freezing point, the surrounding mountains more or less covered with snow, and the weather in general gloomy, wet, and extremely cold.

It was not until the 6th of May that the whitethorn (*Cratæ`gus Oxyacántha*) in the hedges began to exhibit any very evident symptoms of verdure, and the woods were almost entirely destitute of their foliage for some time after; in short, the winter might be said to have been protracted, with little or no exaggeration, until nearly the middle of May.

We have been led to make these remarks from its being generally admitted that the early or late appearance of the summer birds of passage depends entirely upon the state and temperature of the weather, &c.; yet it will be perceived that the swallow and grasshopper warbler arrived unusually early, and, with the exception of the goatsucker, whinchat, and wood wren, all the others about the time they have arrived for the last two years. † A violent storm from the north-east, which commenced on the 28th of April, and which continued, although somewhat abated, for several successive days, will account in some measure for the delay in the appearance of these three species, it having begun about the time they commonly made their appearance in this vicinity. Much might be said upon this very interesting subject, and it is probable we may recur to it at some future opportunity. — *C. Carlisle, October* 26. 1829.

Ichthyology. — *Doree* (*Zèus Fàber* Lin.). Two small specimens of this species were taken in Solway Frith during the late summer; the first on the 19th of May, the second on the 12th of June. The former weighed only eighteen ounces, and was 14¼ in. long; the latter exceeded 17 in. in length, and was upwards of thirty-two ounces in weight. I have been induced to notice this occurrence, as I am not aware that the doree has been met with so far north before. — *Id.*

Pýrola sécunda. — Withering gives one English locality for this plant, in Yorkshire; Smith only mentions Scottish habitats. It is found thickly, though limited to the space of two or three yards, close by a waterfall some distance up a hill on the right-hand side of the road leading from Ambleside to Keswick, and opposite that end of Leatheswater nearer to the latter. — *Hewett Cottrell Watson. Edinburgh, Oct.* 1829.

SOMERSETSHIRE.

Rare Plants found in the Neighbourhood of Yeovil. — Sir, Next to a spread of vital religion, there is nothing better fitted to enlighten the mind or enlarge the heart than the study of the works of creation. It is therefore with much pleasure I have to inform you that your Magazine has kindled a taste for natural history amongst us, which I trust will increase more and more; and I am commissioned by the botanists of this place to send you a list of the rarer plants found in our neighbourhood; desiring you, at the same time, to erase from it the names of those you may consider too common for insertion. We have taken Smith for our guide; and where he has not recorded the plant as of frequent occurrence, we have ventured to give it a place in the catalogue. I am, Sir, &c. — *W. H., R. N. Yeovil, Jan.* 13. 1830.

Festùca lolliàcea.
  sylvática.
Tríticum canìnum.
Anchùsa sempervìrens.
Prímula elàtior.
Campánula *Rapúnculus.*
Erythræ`a pulchélla.
Víola hírta.
Vínca màjor.
Galánthus nivàlis.
A'llium vineàle.
Bérberis vulgàris; perhaps not wild.
Cólchicum autumnàle.
Chlòra perfoliàta.
Polýgonum Bistórta.
Ranúnculus arvénsis.
Làmium incìsum.
  amplexicaùle.
Ròsa arvénsis.
Thýmus Calamíntha.
Galeóbdolon lùteum.
Eròdium moschàtum.
Pelargònium lùcidum.
  colúmbìnum.
Láthyrus sylvéstris.
Ibèris amàra.
A'rctium Láppa. γ
Hypéricum Androsæ`mum.
Erígeron àcris.
Cnìcus acaúlis.
Senècio sylváticus.
I'nula Helènium; a large bed, 20 ft square; certainly wild.
Centaurèa Calcítrapa.
O'rchis bifòlia.
  pyramidàlis.
O`phrys apífera.
Phállus impudìcus *Withering.*

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* Dr. Heysham's MSS.

† See the Magazine of Natural History, vol. i. p. 200.; and the Philosophical Magazine, vol. v. p. 196.

DEVONSHIRE.

Large Birch Tree. — Sir, When in the west of England a short time ago, I observed in the woods of Berry Pomeroy Castle, near Totnes, the largest birch tree, as far as I recollect, in England; and not having seen it mentioned in any publication, I am inclined to send you this notice. By my measurement (not very accurate, I must confess, on account of the peculiarity of its situation) it was rather more than 15 ft. in circumference above the roots. The height I could scarcely judge of, from the density of the surrounding foliage, but I should think it was little less than 90 ft. It struck me as being decidedly the noblest in its proportions of any that I had seen. In its neighbourhood grows another of larger girth, but not so fine a tree. I am not certain of the species, but should imagine it to be *B*étula nìgra. — *T. E. Cambridge, November*, 1829.

CORNWALL.

Rare or uncommon Birds observed in Cornwall, particularly in the southern parts of the county, by Mr. C. Jackson; Jonathan Couch, F.L.S.; and the Rev. J. Lakes, Liskeard Vicarage, Oct. 5. 1829. The names are those in Bewick.

Fálco cyàneus, Hen Harrier; seen occasionally on our wild moors. — F. *Æ*'salon, Merlin; seen in winter; rare. — F. fúlvus; shot at Lonsallos. — F. peregrìnus. There is great reason for believing that this species bred annually a few years since in the cliffs near Charlestown, as a kind of hawk, called, on account of its fierceness and activity, the Wicked Hawk, frequented that neighbourhood; and from part of a stuffed specimen which I found nailed to a barn-door, I think it must have been F. peregrìnus. The species, however, whatever it was, has left the coast. *L.* — F. *M*ílvus; rare.

*S*trìx *O*'tus, Long-eared Owl; rare. — *S.* brachyòtus, Short-horn Owl; in winter only, and then scarce. — *S.* Alùco has been shot at mid-day. *C.*

Lànius *C*ollùrio, Red-backed Shrike, makes its appearance here about 5th May, *J.*; is rather common. — L. excùbitor; a specimen shot near St. Columb, 1828. *L.*

*C*órvus *C*órnix, Hooded Crow; very scarce. — *C. G*ráculus, Cornish Chough. Their numbers are of late much diminished; and in many places where they were formerly common, none are now to be found.

*C*oràcias gárrula, Roller; one shot near Falmouth, Oct. 4. 1822.

*O*riòlus *G*álbula, Golden Oriole. This bird seems to be not uncommon, but is noticed only in the act of *immigration*. A male was killed near St. Austle, in March, 1824; and a female was taken by a fisherman of Polpeno, May, 1828. I have been informed of several instances, in different years, of their having alighted on vessels and fishing-boats near the shore, and again departing. *C.*

Cùculus canòrus. In 1823 these birds abounded in an extraordinary degree; so that when riding along the roads, one might be heard in almost every field. In the following year they were as remarkably scarce. *C.*

*Y*únx Torquílla, Wryneck; very rare.

*P*ìcus màjor, Great spotted Woodpecker; rare.

*S*ítta europæ'a, Nuthatch; scarce.

*A*lcèdo I'spida, Kingfisher. In May, 1817, a kingfisher was watched to its nest in a hole on the margin of the sea, a quarter of a mile distant from a rivulet; and the nest was thus secured and brought to me. It was composed of dried grass, and lined with hairs and a few feathers. The eggs, three in number, were a little larger than a sparrow's, and of a faint bluish colour, and remarkably transparent. *C.*

*M*èrops Apiáster, Bee-eater. In the parish of Madern, in 1807, four of these birds were discovered, and two of them shot. *Drew, Hist. Cornwall.* — *U*'pupa *E*'pops, Hoopoe; rare. Three specimens, which came under my notice, were killed in April. *J.* A pair shot in Lansallos parish. *C.* One shot at Mewbilly: having been only slightly wounded, it was put in a cage, where it lived a few days.

A'mpelis gárrulus, Waxen Chatterer. A specimen shot at Restonnel, January, 1829.

Lóxia curviróstra, Crossbill; scarce. I kept one of these birds for a considerable time in a cage, where its manners were very amusing, and resembled those of a parrot: its song was pretty, but uttered only when the bird was alone. Three of these birds were brought from the Continent in a cage made of fir, which they almost tore to pieces; probably from their eagerness to get at the turpentine, for they did not meddle with an oaken cage. *C.* — L. *C*occothraústes, Hawfinch. A male was killed near Looe, Nov. 1828; another escaped. — L. *P*yrrhùla, Bullfinch; abundant in gardens in spring; in the winter seldom seen, but in low marshy places.

Emberìza *Círlus;* not uncommon. I have seen this bird erect a crest. *C.*

*F*ringílla Montifringílla; in the winter, but rare.

*A*laúda campéstris, Rock Lark; common on all our cliffs and beaches. — *A.* mìnor, Tree Lark; in summer.

*M*otacílla Boárula, Grey Wagtail; in winter it is never seen with the mark on the breast. — *M.* flàva, Yellow Wagtail; not seen in summer, but common in spring and autumn. — *M.* modulàris, Hedge Sparrow. I have frequently observed large excrescences on the bill and legs. *J.* — *M.* provinciàlis, Dartford Warbler; rather scarce, but seen both in summer and winter. — *M.* *Œ*nánthe, Wheatear; common; sometimes met with in winter, when it changes colour entirely, except the rump, which always remains white; the rest of the body is light brown; the quills and tail edged with brown; visits us about middle of March, crossing the channel so early as to show that it must have taken wing before daybreak. None arrive after midday. — *M.* *P*hœnicùrus, Redstart; very rare. I believe I have seen two or three in winter. *C.* The only one I ever saw here was caught in a house at Falmouth, October, 1822. *J.* I saw one near St. German's, May, 1829. *L.*

*T*úrdus torquàtus, Ring Ouzel; scarce. — *T.* ròseus, Rose-coloured Thrush. One shot in his garden at Lostwithiel, some years since, by P. Pomery, Esq., and now in his possession. *L.*

*H*irúndo ripària, Sand Marten; not common.

*C*olúmba *T*úrtur, Turtledove; scarce. I have only met with it in spring and autumn. *J.*

*T*étrao *T*ètrix, Black Game; killed at Wadebridge, in the winter of 1821. — *T.* *C*otúrnix, Quail; not very common; sometimes remains through the winter.

Rállus *Porzàna*, Spotted Rail; rare.

*S*túrnus vulgàris, Starling; seen in winter only. — *S.* *C*ínclus, Water Ouzel.

Trínga púgnax, Ruff. A specimen of the Reeve was killed near Truro in March, 1829; the only one I have seen in the county. *J.* — T. nígricans, Purple Sandpiper. — T. intérpres, Turnstone. — T. *Squataròla*, Grey Plover. — T. islándica, Red Sandpiper. Two were purchased in Falmouth market, in April, 1822. *J.* — T. óchropus, Green Sandpiper. One killed at Hythian, and another at Paramoor, 1824. — T. pygmæ'us, Pygmy Curlew; not uncommon at Swanpool, near Falmouth, where I have known several killed. *J.* — T. pusílla, Little Stint. I have several times shot this species at Swanpool, *singly;* but once saw a flock of ten or twelve there. The bill and legs of this species sufficiently distinguish it from T. minùta, being much stouter, and of a dusky black. *J.* — T. minùta, Least Sandpiper. I shot a specimen of this scarce species at Swanpool, in September, 1822, and have seen one shot there since. These are the only specimens I have ever met with. *J.* — T. lobàta, Grey Phalarope; not uncommon on the coast in winter, but their habits make them seem so rare. They never perch on rocks or the sands; but alight on the water with ease, and are capable of swimming against a rapid tide. Not shy.

*C*haràdrius Hiatícula, Ring Plover; seen in the depth of winter. — *C.* Cálidris, Sanderling; scarce. I have seen two matured specimens shot at Swanpool, and once found a small flock of young ones there.

Recurviróstra *Avosétta*, Avoret. I have seen this bird at Swanpool; and there is a specimen, in the museum at Truro, that was shot there.

Hæmátopus ostrálegus, Oyster-catcher; rather rare.

*F*ùlica atérrima, Greater Coot. Of several specimens which I have examined, not one had the white spot under the eye, as in *F.* àtra. This induces me to consider it as a separate species from the latter bird. *C.*

*S*cólopax Phæòpus, Whimbrel. Arrives in flocks, in May, and is called the May-bird.

Tántalus Falcinéllus, Bay Ibis. Two specimens of this bird (now regarded as the same with T. ígneus, the Glossy Ibis) were killed near Helston, in June, 1825; and two others, at the same time, near Penzance: one of them is now in the Truro museum.

A'rdea *G*rús, Crane. A specimen killed in 1828, in the collection of Mr. Drew, Devonport. — *A. Garzétta*, Egret. Two specimens were shot near Penzance, in April, 1824; one of which is now in possession of Mr. John. *J.* — *A.* purpùrea, Purple Heron. In May, 1822, this bird flew on board a fishing-boat of Polpeno, and was taken.

*C*olýmbus glaciàlis, Northern Diver. A specimen was taken in May, 1823, by one of the Polpeno fishermen, as it lay asleep on the water. It lived for at least a month in confinement, being carried to the water every day. — *C.* urinàtor; common on the coast in winter. I believe this to be the Crested Grebe, in its winter plumage. — *C.* aurìtus, Eared Grebe. A male specimen, in fine plumage, was taken near Truro, in April, 1829, and is now in the museum there. — *C.* rubricóllis *Latham*, Red-necked Grebe; rare. A specimen killed in Falmouth harbour, and another at Looe. — *C. I'mmer*, Imber; common in winter. Two of these birds remained near Looe the whole summer of 1828. *J.*

*P*elecànus Cárbo, Corvorant; rather uncommon. The white spot on the thigh easily distinguishes this, even when flying from the shag, and is thus distinguished by the fishermen as having a watch under his wing. — *P. Grá*culus, Shag. Wherever these birds go to fish for the day, they return to their home about sunset, proceeding in a straight line nearly level with the sea, if the weather be fine; but at a good height if the weather be rough, or likely to be so.

*M*érgus *C*ástor, Dun Diver; rare. — *M.* albéllus, Smew; rare only in severe winters.

Stérna cantícea, Sandwich Tern. I shot a specimen at Looe, out of a flock, in March, 1828, the only time I have seen them. *J.*

*L*àrus *Rissa*, Kittiwake. The young birds, with the dark spot behind the ear, not uncommon in summer. — *L.* crepidàtus, Black-toed Gull. Caught near Falmouth, in 1824. — *L.* parasíticus, Arctic Gull; common on the coast during the pilchard fishery. — *L.* minùtus, Little Gull. A specimen in fine preservation, shot in Falmouth harbour, in October, 1824, is now in my collection at Looe. *J.*

*A*nas nìgra, Scoter; common on the coast in winter. — *A.* clypeàta, Shoveller. One shot in Swanpool, in the winter of 1826. *J.* — *A.* Querquédula, Garganey; scarce, as are most of the duck tribe.

*A*lca A'lle; scarce. Two specimens killed in Falmouth harbour.

Art. III. *Calendar of Nature.*

ENGLAND.

Calendar of Nature in the Neighbourhood of Bungay, in Suffolk, for 1829.

January. Snow and rain until the 16th, when it froze, and continued freezing with slight intermissions to the end of the month. Primrose, stinking hellebore, and common gromwell were in flower in a sheltered situation on the 11th, on which day I saw some male flowers of the hazel expanded; and the winter aconite flowered on the 28th.

February. This month commenced with frost, which lasted for a few days; it rained on the 4th; and, with one or two exceptions, it continued mild for the season until the 23d, when the frost commenced again; it lasted to the end, and was rather severe. Hepatica in flower on the 6th; snowdrop, 7th; purple dead-nettle, 14th; marsh marigold, and female flowers of the hazel, 22d; and the barren strawberry, 28th. Thrush heard on the 8th; missel thrush, 14th; skylark, 15th; rooks building, 22d; lady-bird (C. 7-punct.) seen, 19th.

March. This month, upon the whole, was fine: we had rain or snow ten days, and then but little. Alternate golden saxifrage in flower on the 6th; common whitlow grass and pilewort, 14th; chickweed, 15th; mezereon, 16th; daffodil, 20th; sweet violet and dandelion, 22d; lesser periwinkle, 24th; dog's violet, 29th; and polyanthus, 30th. Frogs croaking on the 20th; bees on wing, 10th; humble bees, 22d; small tortoiseshell butterfly, 22d; ants in motion, 25th; nuthatch heard, 22d; black and white wagtail seen, 29th.

April. A cold wet month: it rained on twenty days; thunder on the 17th; again on the 19th, with hail; and on the 28th. Wall-flower in blossom on the 3d; oxlip, 4th; grape hyacinth, 8th; wood sorrel, 13th; crown imperial and cowslip, 18th; fritillary, 23d; blackthorn and great saxifrage on the 25th. Swallow appeared on the 15th; wryneck, 16th; house-marten, 23d; nightingale, 26th; cuckoo, 27th; redstart, 29th; brimstone butterfly and great tortoiseshell butterfly, 17th; slow-worm, 17th.

May. This month, although not so warm as it is generally expected, was fine: it rained only on six days, viz. the 1st, 3d, 6th, 7th, 8th, and 24th; and on two of those the wet was but trifling. The field hyacinth, wild cherry, and male orchis in flower on the 3d; germander speedwell, 6th; barrenwort, 11th; sweet vernal grass, 12th; oats, 17th; lilac and fly orchis, 17th; Solomon's seal, 20th; horsechestnut, 21st; herb Robert, 22d; hawthorn, laburnum, guelder rose, and columbine, 23d; lily of the valley, 25th; cinnamon rose and bistort, 28th; butterfly orchis, 29th; and thrift, 30th. Swift appeared on the 1st; tiger beetle, 3d; peacock butterfly, 3d; cabbage and argus butterfly, 10th; wall butterfly, 24th; orange tip, 29th; snake, 10th; viper, 17th.

June. The first part of this month was very cool; indeed, it was not until the 20th that the weather could be termed hot, and then, perhaps, only comparatively. It rained more or less on fifteen days, and we had some thunder on the 14th. Corn poppy in flower on the 4th; foxglove and woodroof, 11th; elder, spiked speedwell, and yellow flag, 12th; sweet-william, 14th; common wild pink, 15th; wheat and bee orchis, 21st; larkspur, 25th; evening primrose, 27th. Admiral butterfly on the 25th.

July. A very unpromising month. We had rain on eighteen days; thunder on the 12th and 20th. The 21st, 22d, 23d, and 24th were the only days which could be termed fine. White lily in flower on the 8th; house-leek, 13th; hollyhock, 16th; sunflower, 26th; and stramonium, 27th. Glow-worm seen on the 5th.

August. Rain! rain! It rained on seventeen days. On the 4th thunder with hail. The 7th, 8th, and 9th were hot days. Orpine in flower on the 8th; China-aster, 14th; tiger lily, 15th; and meadow saffron 30th. Wheat cut in several places on the 1st, and some carted on the 11th. Swift disappeared on the 15th. (Saw *one* on the 23d.)

September. Notwithstanding we had rain on thirteen days, and the marshes in the neighbourhood were flooded on the 14th, September may be considered as having been, upon the whole, a tolerably fine month. Ladies' traces in flower on the 13th.

October. In this month it also rained on thirteen days; snow on the 8th and 31st: upon the whole, very cold and unpleasant. Ivy in flower on the 12th; Laurustinus, 15th. I did not notice the departure of the martens and swallows, nor did they congregate in the usual place.

November. The beginning of the month cold with frost; a few fine but cold days from the 5th to the 9th, and then cold and wet weather to the end. Rain on nine days; snow on the 25th.

December. With the exception of a day or two in the first and second weeks, a cold frosty month. Snow on the 10th, 17th, 20th, 25th, 26th, and 27th. Frost commenced regularly on the 21st, and continued to the end of the month. Sweet coltsfoot in flower on the 6th; and, in sheltered situations, on the same day, I saw the primrose, meadow saxifrage, acrid crowfoot, and white nettle in blossom.—*Daniel Stock. Bungay, Jan.* 11. 1830.

Journal of the Weather kept at High Wycombe, Bucks, Lat. 51° 37′ 44″ North, Long. 34′ 45″ West, during the Year 1829, with Monthly Observations. By James G. Tatem, Esq., Member of the London Meteorological Society.

Table of the Thermometer and Barometer.

Month.	Thermometer.				Barometer.			
	Mean.	Greatest variation.	Greatest Heat.	Greatest Cold.	Mean.	Greatest variation.	Greatest Height.	Lowest extreme.
January -	30·26209	21·51209	43	8.75	29·5215	0·7715	30·07	28·75
February -	37·08928	24·08928	48·5	13	29·78714	0·86714	30·3	28·82
March -	37.65927	19·34073	57	19·5	29·58494	0·62494	30·08	28·96
April -	41·60208	15.60208	57·5	26	29·28477	0·60477	29·86	28·68
May -	51·17338	20·82662	72	34	29·7801	0·4401	30·18	29·34
June -	54·91875	20·41875	74·5	34·5	29·77044	0·62044	30·14	29·15
July -	55·91532	16·91532	72	39	29·54881	0·52881	29·94	29·02
August -	54·39314	19·60686	74	38	29·62236	0·62236	29·98	29—
September	49·78541	15·78541	62·5	34	29·49855	0·60855	29·99	28·89
October -	44·88709	19·88709	60·5	25	29·78366	0·59366	30·16	29·19
November	37·2625	17·2625	53·75	20	29·715	0·465	30·16	29·25
December	30·3387	16·8387	45·5	13·5	29·8472	0·4972	30·33	29·35
For the Year	43·77391		74·50	8·75	29·64537		30·33	28.68

Table of Rain, Snow, Fair Days, and Wind.

Month.	Number of fair days.	Number of rainy days.	Number of snowy days	Rain.	Winds.							
				In. Dcl.	N.E.	East.	S.E.	South.	S.W.	West.	N.W.	North
January -	16	9	6	1·08125	11	1	1	1	1	2	6	8
February -	18	10		1·41875	4	7	1	1	4	3	6	2
March -	26	5		0·575	12	5	2	1	1	1	1	8
April -	6	23	1	4·45625	4	2		4	10	4	4	2
May -	27	4		0·50625	5	6	2		2	3	4	9
June -	18	12		3·6	7		3	2	7	1	7	3
July -	10	21		4·7625		3	3	3	13	3	4	2
August -	13	18		4·68125			4	3	9	5	8	2
September	11	19		4·48125	2		3	4	4	7	8	2
October -	17	13	1	2·0375		1		2	3	9	10	6
November	20	9	1	1·55	1	1		3	5	5	11	4
December	24	1	6	0·33125	6	6	6		1	1	4	7
For the Year	206	144	15	29·48125	52	32	25	24	60	44	73	55

January. The month was colder than in 1827 or 1828, and the quantity of rain and melted snow considerably less than in January, 1827, and not a fourth part of that in 1828. The mean of the barometer lower than for the last 7 years. Snow fell on six different days, the whole quantity about 1·75 in. in depth. A beautiful lunar halo observed on the 17th, about 11 P.M. The evaporation 0·08125 of an inch.

February. The temperature of the month was below those of the last 2 years, according to the *mean*, but the extreme of cold was not so great as in 1827, though 10·25° below that of last year. The barometer higher than since February, 1825. The quantity of rain nearly the same as in the corresponding month last year. The weather generally dull and bleak, with the wind mostly from the northward and eastward. The evaporation 0·00625 of an inch.

March. Less rain fell (only on five days) than even in March last year, which was distinguished by extreme dryness. The mean temperature lower than since 1823, and the extreme cold greater than any, observed by the journalist, in the same month, during the last 12 years. The barometer below the mean of last year, though above that of 1827. Very few brilliant days occurred, and the weather was generally dull, cold, and bleak. A lunar halo, with misty area, seen on the night of the 16th. The evaporation 0·2 of an inch.

April. The month commenced with snow; about 1·5 in. fell on the night of the 1st, and the whole month was extremely cold; the mean temperature being below any one in April since 1823, and more than 3° lower than the average of the last 12 years. Rain, with the snow on the 1st, fell on 24 different days, the whole quantity remarkably great, exceeding that of last year by nearly an inch. The mean of the barometer lower than for many years, although the range was not very great. Very heavy gales of wind at the latter end of the month, particularly on the 28th, which were similar to those frequently experienced at the equinoxes. Thunder heard on the 10th about 2 P.M. The evaporation 0·08125 of an inch.

May. During the whole month the barometer was remarkably high, and the mean much above any one in the last 13 years. The quantity of rain less than in 1818. Nearly 1·5 in. more fell in May, 1828. The weather generally fine, yet the mean temperature did not reach either of those of the last 2 years. An indistinct lunar halo seen on the 10th, about 10 P.M. A heavy gale of wind from the northward on the night of the 25th. The evaporation 0·60625 of an inch.

June. In the early part of the month there was much threatening weather, yet but little rain fell until the latter end, when there were frequent heavy showers, upwards of 1 in. fell on the 27th, and nearly as much on the following day; the whole quantity more than since 1824. The temperature much below June last year, the range of the thermometer 40°, and the minimum only 2·5° above the freezing point. The mean and extremes of the barometer rather above those of June last year, and the average of the month. On the 25th a slight thunder storm, with some little lightning between 2 and 3 P.M. An indistinct lunar halo, with misty area, observed on the night of the 9th. The evaporation 0·45 of an inch.

July. More rain fell in the month than in any July since 1823, the weather of which month, in that year, it very much resembled; the mean temperature was very nearly the same; the maximum of heat lower than usual, and the minimum about the average. The barometer higher than last year, although lower than ordinarily in July, and nearly approximating to the mean of 1823. Thunder heard on the 2d, 8th, 18th, and 24th. Slight storms were experienced on the two last of these days, and the lightning on the 24th (about 12 P.M.) was very general, but not extremely vivid, and for some little time the rain fell with extraordinary rapidity. On the 9th what appeared a heavy storm passed over to the north-east, but no thunder was heard here. The evaporation 0·2 of an inch.

August. The same similarity to the weather of 1823, noticed last month, occurred again in this; the minimum of the thermometer the same, and the range only 1° greater than at that time; the mean, however, was less than any one in the last 13 years; the month was consequently cold, and the quantity of rain was unusually great, being only exceeded by the quantity which fell in last August. From the 22d to the 28th were continual gales of wind from the west and north-west, and nearly half the rain fell in that time. Thunder heard about midnight of the 27th. The evaporation 0·39375 of an inch.

September. On 19 days rain fell, and the total quantity was greater than in the last 3 years; the mean temperature below any one in September since 1820, and the maximum lower than ever noticed, by the journalist, in the same month. A corresponding depression was observed in the barometer, the mean being lower than for 13 years. Thunder heard on the 12th and 15th. The evaporation 0·3125 of an inch.

October. The month was distinguished by a remarkably early fall of snow, the earliest that has occurred during the journalist's observations. The 6th was a fine autumnal day; on the next morning rain fell for some little time, when snow followed for some hours but did not lie; the quantity of rain and melted snow on that day was nearly half an inch. The mean temperature of the month lower than since 1823, another instance of the similarity of the weather in the two years. The barometer lower than last year, but above the average of the month; the whole quantity of rain and melted snow less than usual; the wind between north and west during the greater part of the month. A lunar halo, with misty area, seen on the 15th from 7 to 10 P.M. The evaporation 0·15 of an inch. The last very early fall of snow was on the 21st of October, 1819.

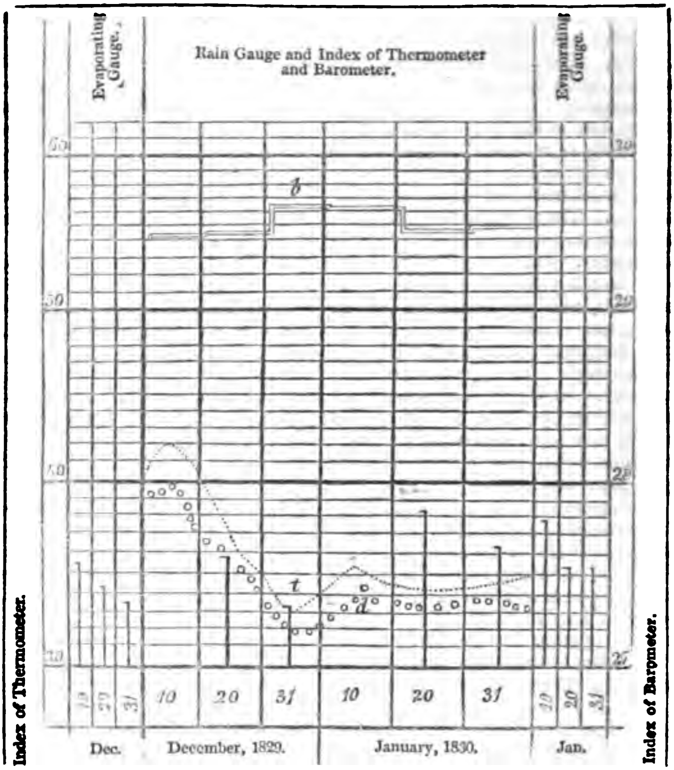
November. The mean temperature of the month below any one in the same month during the last 7 years, although the maximum was above that of 1826, and the extreme of cold not equal to that of last year; the quantity of rain less than for many years, with the exception of what fell in last year. So small a range in the barometer has not occurred during the last 12 years; the mean above the general average of the month, but not so high as in 1827. About 6 in. of snow fell on the 24th, but was all melted in 2 days. Lunar halos, with misty areas, seen on the nights of the 8th and 9th. The evaporation 0·075 of an inch.

December. The barometer during the month was very high, the mean much above any one in the last 7 years, and the maximum higher than since December, 1827, the range only 0·98 of an inch. The month was also extremely cold, the mean being upwards of 10° below those of the last 3 years. Snow fell on the 18th, 19th, 21st, 23d, 24th, and 27th; the whole quantity little more than 3 in. The rain and melted snow only 0·33125 of an inch, a quantity little more than one eighth of what fell in last December, which was much less than usual. The evaporation 0·03125 of an inch.

SCOTLAND.

Diagram (*fig.* 36.), showing the Motion of the Mercury in the Barometer and Thermometer, and the Dew Point, or the Mean of each, for every Ten Days in December, 1829, and January, 1830; also the Depth of Rain in the Pluviometer, and the Quantity of Moisture evaporated in the Evaporating Gauge, for the same Period; as extracted from the Register kept at Annat Gardens, Perthshire, N. lat. 56° 23½′, above the level of the sea 172 ft., and 15 miles from the coast, being the mean of daily observations at 10 o'clock morning and 10 o'clock evening.

36



The coldest day in December was the 26th: mean temperature of that day 29°; wind N.; extreme cold 25°. The warmest day was the 5th: mean temperature of that day 51°; extreme heat 54°; wind S.W. There were only 2 days of brilliant, and 6 days of partial, sunshine; 23 days were cloudy. Rain and snow fell on 5 days, 26 days were fair. Depth of rain and melted snow 0·9 of an inch. The wind blew from the east and north-east on 12 days, from the north 7 days, and from the west and north-west on 12 days. There were loud gales of wind on the 11th, 12th, and 13th. The annual mean temperature for the year 1829 was 46°, which is 1·7° below the ordinary average. Annual depth of rain 28·22 in. Ordinary or average fall is 26·38 in.

1830. The coldest day in January was the 28th: mean temperature of that day 31·5°; wind N.; extreme cold 27°. The warmest day was the 26th: mean temperature of that day 39·5°; extreme heat 44°; wind S.W. There were 8 days of brilliant, and 5 of partial, sunshine; 18 were cloudy. The wind blew from the east and north-east on 12 days, from the north on 5 days, and from the west and north-west on 14 days. There were loud gales of wind from the north-west on the 6th and 7th, from the north on the 9th, and from the east on the 13th. Slight showers of sleet and snow fell on 8 days. Mean temperature for the month 35°; depth of rain and melted snow 1·4 in.

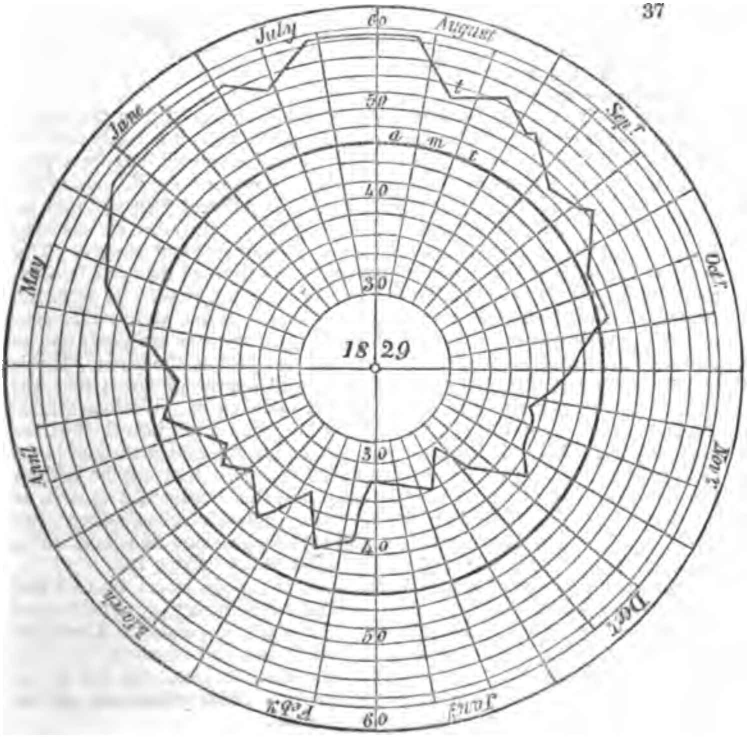
After 5 weeks of a temperature averaging between 39° and 40° in November, a south-west wind on the 5th and 6th of December was accompanied with a temperature elevated to 51°. Charmed by the appearance of spring, blackbirds began to sing on the 6th, and partridges chimed their love-notes, and began to pair. The deception was of short continuance: hoar frost, followed by slight sprinklings of snow, gave the vale of the Carse of Gowrie a mantle, which, though only 3 in. deep, lay undissolved for 3 weeks.

Although the mercury in the thermometer never fell below 25°, yet the storm continued throughout the whole of December, and the greater part of January. The mercury in the barometer ranged unusually high for the season, as will be seen from the diagram, and while we heard of the Seine and the Thames being frozen over, such was the mild and lingering nature of the storm in this quarter, that ice 2 in. thick could not be easily obtained for preserving.

Vegetation for the two past months has been stationary above ground wheat sown on the 29th of October gave a braird on the 9th of December, a period of 41 days. Mean temperature of that period 40·4°. Wheat sown on the 26th of November has not yet appeared. The winter aconite is just beginning to break the surface; it was in flower last season by the 23d of January. The berries of the *A′rbutus* Unèdo (winter strawberry) only begin to colour, and a great part are still green. During these 18 past years the berries on the same plants were ripe by the end of January. The low temperature in October and November has retarded the ripening process.

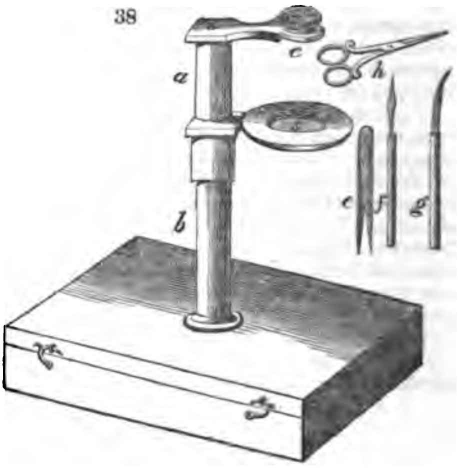
The following Table (*fig.* 37.) will show, at one view, the mean temperature (*t*) for every 10 days in 1829, and the dark line (*a m t*) the annual mean temperature. (*Enc. Gard.*, 2350.) — *A. G. Annat Gardens. Feb.* 1. 1830.

37



ART. IV. *Description and Use of the Botanic Microscope.*

DESCRIPTION and Use of the Botanic Microscope. — Several readers having expressed a wish that we should describe the use of a cheap microscope, we give the following as the most suitable for general purposes: —*a b* (*fig.* 38.) is a pillar, which screws into the top of the box, containing the whole of the apparatus. *s* the stage for laying the objects on; it slides up and down the pillar, to adjust the object which is to be laid upon the stage, to the focus of the magnifier *c*, three of which belong to this microscope. The knife *g*, needle *f*, and scissors *h*, are used in dissecting or separating the parts of flowers, &c. *e* is a pair of tongs for taking up any small object, or turning it about on the stage. There is an ivory plate fitted to the stage, black on one side and white on the other; dark-coloured objects should be laid on the white side, and *vice versâ*.



To use the Microscope.—When taken out of the box, slip on the stage; and having screwed the pillar into the top of the box, it is ready for use. Lay the object on the stage, and slide it up and down till it appears perfectly distinct: as most persons' eyes differ, every one should adjust the object to his own. The three magnifiers are of different foci, and may be used separately, or either two of them together, or all three, by screwing them one on the other, making, in this way, seven different powers. The smallest magnifier has the largest aperture. When more than one is used, the least magnifier, or that with the largest aperture, should be next the object. Let as much light as possible fall on the object while under examination, particularly when the greater magnifying powers are used; and be attentive not to shade it with the hat, or other part of the dress. If this precaution is not attended to, the objects will appear obscure; this will also be the case if the magnifiers are not quite clean. Wash-leather is the best thing to wipe the glasses with, and a piece is put into the box for that purpose. This microscope is not confined to the examination of botanical subjects, but may be used for any kind of objects that can be laid on the stage, such as specimens of minerals, seeds, shells, insects, &c.; and, as a contrast to these, artificial objects, as medals, coins, intaglios, cameos, fine writing, printing, miniature-painting, and engraving; silks, fine lace, linen, watch-work; in short, any of the finest works of art. Price 12*s*.

There are a variety of other microscopes, at various prices, up to 7 and even 10 guineas, and we have seen one in the workshop of a celebrated manufacturer at Munich, the price of which was 150 guineas. There are also various magnifying glasses in use by naturalists, and especially by mineralogists, at various prices, from 1*s*. 6*d*. upwards. A good plan for an intending purchaser is to state his wants to a respectable tradesman, and be guided in a great measure by his advice. — *Cond.*

ART. V. *Hints for Improvements.*

The Zoological Society and Garden. — After what has taken place at the Medico-Botanical Society (*Gard Mag.*, vol. vi. p. 104.), and at the Horticultural Society (*Ibid.*, p. 104.), would it not be wise in the council of the Zoological Society to pass a by-law to the effect that every year a regular professional accountant should be employed to draw up a complete statement of the accounts of the Society; I mean such a one as would give one merchant a complete idea of the circumstances of another merchant; and that copies of these annual statements should be sent to all the members of the Society? The treasurer of this Society being the honorary secretary of the Horticultural Society is rather ominous; but I hope he will have good sense enough to resign. — *F. Z. S. Feb.* 10. 1830.

A Depot for the Exchange of Natural History Articles. — Sir, The naturalist, whom professional or other duties confine to a strictly local dwelling, often experiences great difficulty in procuring specimens of plants and animals from other quarters, when desirous of studying something of Nature's productions beyond those of his own immediate vicinity; and, if not fortunate in distant or locomotive scientific friends, it becomes almost an impossibility to him, by reason of the local habitats of so many of our animal and vegetable productions. To remedy this inconvenience, felt more or less by all naturalists, and to afford facility for the exchange of specimens, it would be very desirable for those interested in natural history, and forming museums or collections, to have some fixed place where their supernumerary specimens might be sent, and from which they could receive others wanted, either in exchange for their own, or by payment of a certain price for each specimen. I am strongly persuaded that if some competent individual in town would allot a room and portion of his time to this scheme, it might be made to answer as a pecuniary speculation, and be of great general utility to naturalists. He might obtain remuneration for his services either by stipulated charges on all exchanges effected, or by yearly subscriptions or entrance fees from all persons placing specimens in his hands. As personal attendance in town would be inconvenient to many who would be most likely to support and be benefited by such an establishment, some plan must be adopted to facilitate the exchange or sale of specimens. Suppose appointed individuals take Smith's *English Flora*, Stephens's *Catalogue of British Insects*, &c., and, running over the species, mark each one with a number corresponding to its rarity, or other circumstance enhancing its value; these numbers being so arranged, that one species marked 12 shall be worth four specimens of those numbered 3; one of No. 60 be equal in value to five of No. 12, and to twenty of No. 3. These numbers might be regarded as stamping a commercial value, and would thereby enable the naturalist, who might have none to give in return, or not wish to receive any, to sell or buy, which would still further increase the facilities of obtaining desired species. The numbering or pricing could easily be arranged, by estimating all mineralogical, botanical, entomological, and conchological species as No. 3 (or *3d.* each), unless otherwise stated; those regarded as more valuable having an appropriate number attached to them. Vertebrate animals, dead, prepared, or alive, should, in like manner, have a minimum price for each state, and an increasing scale. An establishment of this nature might be limited to the productions of the British Isles, or include exotic natural history. A general catalogue of species, with the numbers affixed, might be published as a guide to those sending or requiring specimens. By inserting these hints in your Magazine, the attention of naturalists may be directed to the utility of the plan here proposed; and if they can elicit any advice from yourself on the subject, it will much gratify, Yours, — *H. C. W. Edinburgh, Oct.* 1829.

A Society of Naturalists. — Sir, I am much pleased to find the suggestions of your correspondent K. (p. 286.) followed up by those of J. R. in the last Number of your Magazine (p. 395.), relative to the formation of a society for the encouragement of natural history, as there can be little doubt that, with some trouble and attention, one might be formed on such a plan as would meet with very general support; for although we have the Linnean, Medico-Botanical, Geological, and Zoological Societies, yet, I think, if one were formed in the more comprehensive nature of a Society of Naturalists, many might be induced, and would be very glad, to join it, who would not like the expense of subscribing, or ever think of belonging, to four or five separate societies; and I beg to suggest that the society should be of a more sociable description than most of the present scientific societies; that is, I mean to say that the meetings should be more frequent, so as to bring the members more in contact and better acquainted with each other, and afford opportunities of imparting their knowledge and observations.

If any thing of the kind alluded to by your correspondents should be seriously entertained, and a meeting for the purpose proposed, I hope you will give notice of it in your Magazine, as myself and many of my friends would be glad to join and support it as far as in our power. I am, Sir, &c. — *W. A. Sept.* 1829.

The Idea of a Botanical Society, with a garden in the Regent's Park, like that of the Zoological Society, for the purpose of introducing and improving new species of ornamental plants, is suggested by — *An Admirer of Nature. October* 3. 1829.

Rarer Birds, when and where shot. — I venture to propose to you the propriety of devoting a small space in your Magazine to the mention of the rarer British birds, when and where shot. I conceive the information would be valuable to numerous persons now forming cabinets of the British birds. I have myself received three species within these few days, which I have never seen or heard of in this neighbourhood, and have anxiously looked for; namely, the Grey Phalarope (Phalàropus lobàtus), Black-throated Diver (Colýmbus árcticus), and Stone Falcon (Fálco Lithofálco). — *Edward P. Thompson. Dover, Dec.* 8. 1829.

ART. VI. *Retrospective Criticism.*

REPLY to the Strictures of "A Friend to Fair Criticism." (p. 84.) — Sir, Had I seen *Fair Criticism* in company with him who professes to be his *friend*, I should not have requested your permission to occupy some space of your Magazine in replying to his observations upon me; but as he appears to have introduced *Unfair Criticism* by that name, I must beg leave a little to put aside the mask worn on the occasion, and to convince your readers that this personage appears "under the suspicious denomination of an alias." But I fear I am flippant again. I must contract my brow, and resume my dignity. This gentleman (whom, to spare space, I will designate by two of his initials, A. F.) has pretty broadly *hinted* that the review of the *Journal of a Naturalist*, in a former Number of your Magazine, was not *fair criticism*. Let me ask him, where is the unfairness of that criticism which, quoting *word for word* the passages which call forth its animadversions, leaves the reader full powers to form his own opinion, and, should he think the censure unmerited, to return that censure upon the writer? Had your "indignant" correspondent quoted as fairly as I have done, he would not have given his readers to understand that the poor stone-breakers were represented as earning 2*s*. 8*d*. or 3*s*. a day, by the united exertions of four persons, "in the worst of times, and under the least favourable circumstances;" but, under *the most favourable* circumstances of the winter season, the weather being good, and the whole family in health. In the few lines which the writer has actually quoted from this part of the journal (independently of his own observations upon them), there is, it is true, little to call forth the remarks which have excited his indignation. That I admit; but why is this? Because this "*friend to fair criticism*" has cited from those remarks a few sentences, of which the import is materially changed by their separation from the context, and has, at the same time, *omitted the passages to which they refer*. "The reviewer," says A. F., "falls foul of the author (who, if he be not an errant hypocrite, must be an amiable and kind-hearted man), and accuses him — of what? — why, '*of utter insensibility to the misery he describes*,' viz. of the poor; and, moreover, attributes this want of feeling to '*a habit of enjoying his own ease, without thinking of others; and of looking upon the poor (perhaps unconsciously to himself) as an inferior race of beings*.'" He does not add, that I speak of the naturalist, in the same page, as "apparently *an amiable and kind-hearted man*." I believe him to be such; but I also believe (and this is by no means incompatible) that he is one of the many who, living, day after day, a life of ease, accustomed to the sight of the poor, and taking it for granted that *they* are tolerably comfortable too, remain insensible to the misery around them; not from heartlessness, but from want of due reflection. One says, "If the poor cannot get bread, why don't they eat cakes?" Another observes that they have a "little bread," and plenty of potatoes; and calls this well-doing. Which of us would think it well-doing, if we ourselves were reduced to a diet of potatoes, with "the aid of a little bread?" Not one. How, then, can we think it good living for the poor (the appetite sharpened, too, by hard labour), unless we consider them as an inferior race? Cats and dogs are to be fed with meat; horses, upon hay and corn; ourselves, upon all the dainties of land and sea; pigs and the labouring poor upon potatoes!

Had the author of this pleasant little work been less accustomed to witness the wretched condition of the poor labourers, I am persuaded he would have spoken of them in a very different manner. Instead of boasting of their well-doing, he would probably have been shocked to think that, to obtain the mere necessaries of a comfortless existence, many a poor mother (to the utter neglect of all maternal duties) should be compelled daily to work with her husband in the fields and highways, and to behold her children labouring by her side, until, stunted in growth and cramped in mind, they are sent forth into the world to seek other employment for the support of a life which, having always been a burden to them, they will the less hesitate to forfeit to the laws, by the infringement of those rights of which they never have known the value.

It was not until some time after the review was written and printed, that I knew, or ever had heard, the name of the author of the *Journal*. I then learned that he was the friend of a respected and highly esteemed friend of my own; yet my opinion remains unchanged. Though amiable and kind-hearted, I yet think that he falls short of perfection, and that some passages in his work are calculated to increase an evil already of sufficient extent; and thus to become an instrument of mischief which he never contemplated. Let me request of the reader, when he lays aside the second review of the volume, to take up the first, and to judge for himself whether or not there be any thing in it like a malicious intention, or a design to wound the feelings of the author.

I must, however, plead guilty to having said that the volume was grass-green, of sufficing plumpness, &c., and to *not* having said " of what exact dimensions " I " would have the book." But let me plead in extenuation, that I was totally ignorant of any censure conveyed in these very severe expressions, the rather as I designed none; but particularly liked the appearance of the volume in every respect, and (*as I said*) thought " both the name and aspect inviting." Still, as it is considered by many persons that every member of the fraternity of critics should wear his crown of plurality, and walk in stilts whenever he appears in public, it was doubtless a misdemeanor to condescend to be pleased, and to express my pleasure in a natural and uncritical manner: I should rather have said, " We approve of the sober yet verdant hue of this unpretending little volume, since, however unimportant in *our* eyes," &c.

The reader may conceive the regret which I must feel in acknowledging to my kind adviser that there is no hope of my improvement from the source he proposes, as Dr. Coplestone's pamphlet, entitled *Hints to a Young Reviewer*, was familiar to me years before I became one. Entertainment, indeed, I might yet derive from the perusal, though it should be the tenth. I believe it is now out of print; and if A. F. will confer so great a benefit upon reviewers and authors, writers and readers, as to persuade some one to republish it (and this, as a Friend to Fair Criticism, he is surely bound to do), I will promise him to lose no time in reviewing it, and will endeavour to please him better. — *K.* *January* 14. 1830.

A Term misapplied. — Since you so good-naturedly submit to be criticised by your correspondents, let me ask how you will justify the terms of one of the titles which appears in the last Number of Vol. II., " Inferior *dexterity* of the *left* hand." Dexterity is derived from *dexter*, the right hand: how, then, can the left hand have the term applied to it? Surely " activity," or some such term, would have been more suitable, though not so amusing. — *John Thompson. Hull*, *Jan.* 11. 1830.

The Jussieuean, or Natural, System of Plants. — Being acquainted with the Linnean system, but almost entirely ignorant of that of Jussieu, I anticipated much information from the papers on that subject to be given in the Numbers of your Magazine. The first was excellent; but the second, as far as furnishing that precise knowledge which the student requires, decidedly a failure, for want of definitions and engravings. — *J. H. Davies. Portsmouth*, *Aug.* 1. 1828.

We found that the definitions would occupy too much space, and being scattered through different volumes, would lose much of their utility; we therefore considered it best to drop the continuation of this article. Our readers may find the whole of it at the end of the *Encyclopædia of Plants*, and also in the *Hórtus Británnicus;* and those who wish to study the system fundamentally, may consult Clinton's translation of Richard's *New Elements of Botany* (8vo, 14s.), or wait till Mr. Lindley's work appears. — *Cond.*

Translation, &c., of technical Terms. — I cannot but agree with A. (Vol. I. p. 200.), that the introduction of the derivations, &c., into the text rather distracts the reader, and might " with advantage occupy, as a glossary, the last page of the Numbers;" or perhaps, what would be better, might be inserted as notes at the bottom of the page in which they occur: but, at all events, they should not be omitted, as they are a very excellent feature of the work; indeed, I trust you will continue to follow up that plan, by giving the plainest explanation of every technical term; and, if any inconvenience should arise by an alteration of the present mode, I would rather they should remain as they are given, than that one should be omitted. — *J. H. Davies.*

Museum, Royal Naval Hospital, Hasler. (Vol. I. p. 191.) — The rooms should rather be said to be *appropriated* than *erected*, as the small building dividing the left wing, now adopted for this purpose, is part of the original edifice. — *J. H. Davies.*

Portsmouth Philosophical Society. — Vol. I. p. 190., line 18., for "*Branden*" read "*Brander.*" Gustavus Brander published, in 1766, a small volume, with figures and descriptions in Latin, of the fossils of the Hordwell Cliffs. These cliffs extend along the sea-shore from Lymington to Christchurch, Hants, and are divided by two chasms, called Beacon and Chewton Bunny's, into three portions, named Hordwell, Barton, and High Cliffs. It was from the second of these, abounding in fossils of the London clay formation, that Brander collected his specimens, which, by the titlepage, he appears to have deposited in the British Museum. The work is now scarce, but the fidelity of the figures renders it valuable. He appears to have made an accurate research at this locality, as subsequent observers have added but few to his list. He followed the Linnean classification, but was singularly unhappy in discriminating his genera: thus many of his *Mùrices* are Volùtæ; and his Hèlix mutábilis, a very characteristic shell of this formation, is an umbilicated *Nerìta*, and very nearly approaching to the *N.* glaucina of our shores. The work is entitled *Fossilia Hantoniénsia*, and the figures of the shells have certainly never been surpassed. Mr. Webster has since given a very accurate and interesting description of the cliffs alluded to, in the *Geological Transactions*, 2d series, vol. i. part i. p. 90.; in which he has identified in the Hordwell Cliff a fresh-water formation, analogous to those existing on the opposite shores of the Isle of Wight. — *Id.*

Mermaids. — A few years back a mermaid was shown in London, very like that figured by Conchilla (Vol. I. p. 106.), except that it had arms, and was not quite so large: it is, I believe, now travelling the country. This specimen also was said to come from Japan. I can aver that it came from the East Indies; for, being at St. Helena in 1813, I saw it on board the ship which was bringing it to England. The impression on my mind was, that it was an artificial compound of the upper part of a small ape with the lower half of a fish; and being allowed to examine it as closely as I pleased externally, my attention was directed, by the aid of a powerful glass, to ascertain the point of union between the two parts. I confess I was somewhat staggered to find that this was so neatly effected, that the precise line of junction was not satisfactorily apparent. I speak of it in its best state of preservation: perhaps now the imposture can be more easily detected. A short time back the skeleton of a mermaid, as it was called, was brought to Portsmouth, which had been shot in the vicinity of the Island of Mombass. This was allowed to be submitted to the members of the Philosophical Society, when it proved to be the Dugong. The anatomy and natural history was illustrated by some of the members present, and briefly noticed in the *Annual Report* for 1826-7, p. 21. To those who came to the examination with preconceived notions of the fabulous mermaid, it certainly presented, as it lay on the lecture-table, a singular appearance. It was, if I recollect right, about 6 ft. long: the lower dorsal vertebræ, with the broad caudal extremity, suggested the idea of a powerful fish-like termination; whilst the fore legs, from the scapula to the extremities of the phalanges, presented to the unskilful eye an exact resemblance to the bones of a small female arm. The cranium, however, had such an *outré* brutal form, that even the most sportive imagination could never have supposed it to have borne the lineaments of the "human face divine." It is now, I believe, in London. — *Id.*

The Chameleon. — This animal *does not* take hours to effect its change of colour, as stated by S. R. A. (Vol. I. p. 192.): its changes are often instantaneous, and frequently repeated, according as the animal is situated. I have a live one at this present time: it is the favourite pet of my youngsters, delighting to crawl about their persons, and take its food from their hands; and, if desirable, I will draw you up a notice of its habits for a future Number. — *Id.*

We shall be happy to receive such a communication, and take this opportunity of expressing our regret at having so long neglected to insert our valued correspondent's remarks. — *Cond.*

A Water Shrew, similar to the one described in your Magazine, was seen lately at noon in a pond near Somerton, in the county of Somerset, and appears not to be at all uncommon here. — *M. January*, 1830.

The Goatsucker, and Mr. Harvey's Camelopárdalis. — Sir, Mr. Dillon's theory as to the use of the goatsucker's serrated claw is so ingenious, that I think it worth noticing. Among numerous reasons which could be brought against it, I shall merely inform him that there is an American group of this family, which have no bristles round the bill, and yet have serrated claws; and another group in Australia *having* bristles, and yet with the claw smooth and simple. The Heron tribe, in like manner, have the rictus smooth, but have the claw serrated: finally, the bristles round the bills of *all* the purely insectivorous birds I have seen (and they are not a few) are capable of being diverged and contracted. The philosopher of Selbourne, I suspect, is right in his conjecture.

Your scientific readers must be anxiously expecting a description of the new species of Camelopárdalis figured in your frontispiece, distinguished from that already described, by having, like the camel, a lump upon its shoulders. Mr. Harvey is an artist of much promise: he is young, I believe; so much the better. Let him study nature *more*, and effect *less*, and his career will be successful. — *S. W. Jan.* 12. 1830.

The Biscacho and Coquimbo Owl. — In Vol. I. p. 285. of your Magazine is an extract from the entertaining travels of Captain Head. With the rough notes of this galloping adventurer in my hand, I am led to suppose that some mistake must have been made by the copyist. The Biscacho and

Coquimbo owl, being two very different animals, are, in the heading, stated to be one and the same thing. The passage quoted relates to the Biscacho, an animal described by Captain Head as resembling a *rabbit*, but which, in the passage I allude to, is called "a bird." The description runs throughout of the Biscacho, but the drawing is that of the owl. — *M. January*, 1830.

The Aerial Spider. — Sir, My devotedness to experimental electricity, for the last fifteen years, *should* certainly, at any rate, have gained for me the requisite qualification for investigations like these, and I therefore cannot cede to an assertion evidence gained through the medium of experiments diligently and carefully conducted. Atmospherical electricity has been with me a favourite study, and I trust it is one in which I find myself in some degree at home; and the employment of Coulemb's *Balance of Tarsim*, with Breguet's *Thérmométre métallique*, has been of essential service to me. Professor Brande has justly concluded that the divergence of the threads in the fasciculi represented by Mr. Bowman's diagram can scarcely be otherwise explained; and a very slight excess of electricity in the excited substance employed as a test for the electric condition of the thread, every electrician knows, would defeat the end proposed. Is Mr. Blackwall aware of this, and have his experiments been thus secured? A spider's thread, darted through the air, must necessarily acquire electricity from the friction occasioned by its impulse through that medium; and, if propelled *counter* to a current, the amount of excitement will be greater; a thread of glass is excited under such circumstances. Is Mr. Blackwall ignorant that a current of air is an excitant of electricity? a fact long ago proved by Bennet and other electricians. The air issuing from the nozzle of a pair of common bellows, and directed on the cap of the electroscope, will occasion a divergence of its pendent leaves. Now, Mr. Blackwall should have known all this: and, permit me to ask, what connection is there between heated currents emanating from the earth and an impulse of air, even on Mr. Blackwall's own showing? I am not disposed to yield to Mr. Blackwall in electrical experiment; and those who have witnessed my illustrations of this branch of science will readily, if I mistake not, give me credit for successful and delicate manipulation. I am in possession of attestations, from other sources than my own, in verification of the asserted fact of the short-lived term of existence, in the case of the *dark-brown glossy gossamer spider*, when imprisoned within narrow precincts, as a small chip box, or tube of glass; and I would just say to others (certainly not Mr. Blackwall) *experimentum fiat.* I have found the result, in nearly twenty cases, with this variety, and have not made the experiment with any other. The "shy retiring truth," however, gleams in his own account of the matter; though

> "He that's convinced against his will,
> Is of the same opinion still."

If my antagonist can satisfactorily confute the facts and phenomena recorded in the volume referred to, he is a more profound wit than I have hitherto given him credit for. This notice, however, is *final* on my part. Mr. Blackwall may continue his appeals to the Council of the Linnean Society, or to the individual authority of Humboldt: I protest, however, against being esteemed accessary to any opinion that would suppose me to *think by proxy*. I am, Sir, &c. — *J. Murray. Nov.* 19. 1829.

Mr. Palmer of Chigwell's Lists of Plants. — Sir, In reading your last Number of the Magazine of Natural History, I must beg leave to say, I was rather surprised to see, among the plants collected by the Rev. S. Palmer of Chigwell, Essex, many that are, I believe, every where almost, in this country, of very common occurrence. Localities of such plants, I humbly conceive, cannot be of any service. *Thy̆mus Népeta* is mentioned, and marked with a star, as being rather uncommon, while *Verónica* spicàta, certainly a much more local plant, is not so distinguished. If ever found in Epping Forest, it certainly merits a locality being given. *Antirrhìnum Elátine* is mentioned as being common in ditches in the neighbourhood of Chigwell. By a ditch is generally meant an excavation with water in it; but the plant in question is found almost exclusively in cultivated fields, and principally on a gravelly soil. Hypéricum púlchrum I have always considered as a tolerably common plant, but it is marked with a star. Among those plants collected in Herts, the Aspérula odoràta and Menyánthes trifoliàta certainly deserve no place. The alpine plant, the Bártsia alpina, from its having been found in Epping Forest, only shows that plants may be found within a few miles of London, which botanists have never thought of collecting so far from their usual places of growth. Thus the Stratiòtes alöides fills a pond on Wandsworth Common; the Tofièldia palústris has been found, I believe, by the foreman (Mr. Bevis?) of the garden at Syon House, on Wimbledon Common, with other rarities. I found the Erythræ̀a pulchélla *Smith* in a boggy part of a common that runs by the side of the road leading from Kingston to Leatherhead; and, what is more singular, on a strong clay soil, as this plant is usually found by the sea-side, and consequently on a sandy soil. In the next page, I find that the Ixòdia procúmbens is mentioned by Mr. Daniel Stock as a plant new to him and to the botanists there. I should conceive that there is no good-sized common or heath where this plant may not be found. If this plant had been rare in Suffolk, Sir J. Smith would have mentioned it in his *English Flora*. — *T. M.* *Oct.* 1. 1829.

Plants with white Flowers. — Various lists of varieties of plants with white flowers have been given in your valuable Magazine, and much interest (if we may judge from the numerous correspondents who have appeared) seems to be taken on the subject; but, after all, very little has been brought to bear upon the point, as your correspondents have mostly given bare lists, without stating the *nature or quality of the soil*, or *peculiar habitat* of their plants: so that, from the mere enumeration of varieties of plants, without reference to the circumstances I have mentioned, we gain little advantage, and no conclusion can be drawn. Having myself frequently met with varieties of plants in botanical rambles, I have tried to ascertain what causes operate to change the colour of the blossom, and I find that it is sometimes merely the effect of a peculiar habitat; sometimes the nature of the soil on which the plant grows appears to be the only reason; and occasionally an accidental circumstance has given a richness to the soil, and manuring it has caused an alteration in the appearance of its vegetation: *e. g.* the common bird's-foot trefoil (Lòtus corniculàtus), which in dry upland pastures is of a brilliant yellow, on the red marly banks of the Severn assumes a deep sanguine orange hue; and a friend informs me that he has observed it on the lias marl, a few miles on the western side of Worcester, perfectly white: in this case the soil affects the flowers of the plant. The bluebell (Scilla nùtans) is not uncommon, in the vicinity of Worcester, with white blossoms; but I have uniformly observed, wherever it so occurs, that the spot is uncommonly shady, or that a wood has, at no very distant time, occupied the place. In these cases, the peculiar locality has an effect upon the plant; and in a deep shady wood on the western side of the Malvern Hills, where, this summer, I found a number of luxuriant plants of the Pàris quadrifòlia, in one spot of the thicket where a straggling sunbeam was admitted through the trees, and glanced upon one of the plants, the blossom was withered and shrunk, and the four leaves variegated. In illustration of the accidental luxuriance of plants, I may mention that I found the O'rchis mòrio, in a moist field near Worcester, double its usual height, and with flowers of a delicate light pink; and around the plant, at this particular spot in the marsh, I noticed some swine's dung had been dropped. In the list of plants (p. 161.) I have noticed in this neighbourhood, varying in the colour of their flowers, though I have mentioned the particulars above, yet, in many instances, I cannot satisfactorily account for the variation. I think, however, the nature of the *soil* should always be examined and noted; and I would suggest to your correspondents to observe this in their botanical communications. — *Edwin Lees.* *Sept.* 17. 1829.

Gryphæ̀a arcuàta. — I wish your F.R.S. had not sent you his drawing of two of the most common fossil shells in England, the Gryphæ̀a arcuàta. (fig. 20. p. 95.) Their position must be accidental, for they have lids like oysters; indeed Linnæus classes them with oysters. — *R. B.* *Jan.* 4. 1830.

Cucúllus simplex. — Sir, At p. 95. of your Magazine, you have favoured us with a drawing of two fossil shells, which, your correspondent says, "appear to be the Cucúllus simplex of Rumphius (tab. 59. tit. B.)." I think, if he refers to Sowerby's *Recent and Fossil Conchology*, he will find the said fossils to be Gryphites; and, according to Lamarck, very distinct from Cucullæ̀a. I am, Sir, &c. — *A Subscriber.* *Jan.* 7. 1830.

Meteorological Observations. — Sir, I feel obliged by Mr. Tatem's notice (p. 95.) of my remarks on his meteorological observations; and, in compliance with his wish, I shall, with much pleasure, explain the course adopted by me in making out my register. I have already briefly alluded to this at p. 204. Vol. II.; but perhaps I have not been sufficiently explicit. In the article Meteorology, p. 159. of *Brewster's Encyclopædia*, it is assumed that the mean temperature, by daily observations at 10 A. M. and 10 P. M. *with an ordinary thermometer*, coincides with the mean of the *daily extremes;* and the mean taken in this manner, compared with the mean of the daily extremes for 71 months, gives only a difference of 0·3°, and in some years there is not the smallest fractional difference; and my own observations corroborate what is there stated. For example: at 10 A. M. I find the thermometer indicate 50°, and at 10 P. M. 40°. These results are marked in separate columns, and the mean 45° extended in a column by itself. On examining my night and day thermometer at 10 P.M., I find the minimum 38°, and the maximum 52°; the mean of which is also 45°. Should any fractional difference occur, the mean of means is taken for the true mean; but knowing that such difference is extremely slight, I have repeatedly recommended taking the mean, as stated above, with *an ordinary thermometer*, with a view to encourage gardeners to keep registers, who may not have self-registering thermometers. Every ten days the true mean is added, and divided by 20 for the mean of that decade. The monthly mean is obtained by dividing the sum of the true daily means by the number of days in the month, and the annual mean by dividing the sum of these by 12. The mean of the barometrical range is taken in the same manner. The dew point is ascertained at 2 o'clock by plunging a thermometer in a glass of water, cooled, if necessary, by frigorific mixtures, noting the temperature when the dew ceases to appear on the outside of the glass. Spring water at 47° often effects this in summer without any mixture. I also employ Leslie's differential thermometer for a check, but the calculations are tedious.

The annual average temperature at this place for the last seven years I find to be 47·7°; and at Wycombe, according to Mr. Tatem, it appears to be 46·43°. (Vol. II. p. 96.) Annat Gardens, where my register is kept, are 4·46° farther north than Wycombe; and, according to a formula given by Mayer (*Brewster's Encyc.*, p. 156., art. Meteorology), which, in many instances, I have found to approximate nearly to the truth, the annual mean temperature here should be 47·5°, which is within 0·2° of the seven past seasons. According to the same authority, the annual mean temperature at Wycombe should be about 51°, which comes very near with the annual mean at Chiswick by Mr. Booth. Mr. Tatem's mode of taking his observations accounts for the difference. He informs us (p. 96.) that " the thermometer is examined every day at 8 A.M, 3 P.M. (esteemed the hottest period of the day), and 10 P.M.; and the extreme of cold is ascertained by a self-registering thermometer; thus giving four observations of that instrument, all of which are daily registered; and the monthly mean is found by dividing the sum of *all these* by the number of observations, which, of course, varies with the number of days in each month. From this statement, Mr. Gorrie will see that I refer to the *daily extremes.*" Now, what I understand by the *daily extremes* are the *maximum* and *minimum* only; but it is easy to see that Mr. Tatem cools his maximum considerably by adding his observations of 8 and 10, hours the temperature of which approximates nearly to the minimum in winter: but these two cold periods bear their full share in estimating the mean; which will easily account for annual results being so much below what, according to meteorologists, they should indicate. I hope Mr. Tatem will excuse the freedom of these remarks. I have, agreeably to his request, briefly stated the method by which I keep my register, and given my authority, and I have endeavoured to account for the difference between the results of our observations. I must beg to assure Mr. Tatem that it was the high opinion I entertained of his accuracy that induced me first to notice that difference, and of which, through his kindness, I have been able to trace the cause. I am, &c. — *Archibald Gorrie. Annat Gardens, Feb.* 1. 1830.

ART. VII. *Queries and Answers.*

BEWICK's Relics. (p. 92.) — Sir, Though I deem the chief part of his polite enquiry answered in a previous page, it would be uncourteous not to make some reply to your learned, elaborate, and really useful correspondent, the Rev. W. T. Bree. Yes; it *was* an old horse that my friend Bewick last engraved; and he *has* cut black profiles of very many of his friends, and other specimens of his art, wherewith to illustrate his autobiographic memoir. And I quite concur with the above reverend and ingenious gentleman, that not only the *relics*, but a COMPLETE COLLECTION, of all the works of this " painter" (as he is most properly called) should be published by and for the advantage of his family; whom I have warned into whose hands they commit any of his papers, as lives (like sign-post Shakspeares) of eminent men are often, immediately after their decease, got up to catch a penny, with puff and parade, by heavy book-makers, without *gumption* enough to compose the life and character of a cabbage grub. Could a fit editor be found, who, without departing from his province, and " speaking more than is set down for him, which (says honest Hamlet) shows a pitiful ambition in the fool that uses it," my beloved friends, the Bewicks, would have reason to rejoice, and would liberally come forward, with their friends, in concurrence. Such a work might be considered of national interest, if produced in a superior manner, with its numberless embellishments and illustrations, and the honourable task may well become a Briton. — *John F. M. Dovaston. Westfelton, near Shrewsbury, Jan.* 30. 1830.

The Cause of Goître. — Sir, Your correspondent Obscurus (Vol. II. p. 403.) wishes to be informed what is the most generally received opinion as to the cause of goître, and I should have much pleasure in satisfying him on that point if I were able; but I am sorry to say that no opinion has hitherto been advanced which is at all satisfactory; and as so many eminent individuals have failed in the attempt, I shall not presume to hazard a conjecture on the subject. That it is not produced by drinking dissolved ice or snow, as some have imagined, is evident from the fact that the disease is not uncommon at Sumatra, where neither ice nor snow is ever seen, while in Greenland, where snow-water is commonly used, it is unknown. That it does not depend *exclusively* on a residence in mountainous districts is equally certain, since it is found among all classes of society, in almost all countries, and most frequently among females. Humboldt saw it in South America, in high districts and low ones, in those which were dry as well as in those saturated with damp, in a high temperature as well as in a low one, and worst where the water was chemically the purest. Obscurus is wrong in supposing that the muscles of the neck have any thing to do with true goître, except secondarily, by the extension of the disease to the surrounding parts. It is properly a disease affecting the thyroid gland. As it is generally of little consequence except from the deformity it occasions, those affected with it (in this country at least) are very unfrequently the subjects of a severe operation for its removal; and, if by "the knife" Obscurus means the extirpation of the gland, I believe no one would be so mad as to attempt it, unless the patient's life were in immediate danger from the pressure of the diseased structure on the trachea obstructing respiration. The arteries supplying the tumour (which are generally enlarged) have been tied with partial success, and setons, blisters, leeches, friction with or without medicaments, and pressure, with alkaline and tonic medicines internally, have each and all been more or less successful in different instances; but the greatest dependence at present is upon the preparations of iodine, which are used, not "to neutralise any noxious qualities of the water" drank by the patient, but on account of its peculiar action on the glandular system of the body generally. To its good effects in the early stage of the disease, I can bear witness, but I do not think it would be found equally beneficial in a case of long standing. I am, Sir, &c.—*J. Aaron, M. R. C. S.—Birmingham, Sept.* 17. 1829.

A Fight between a Rat and a Hedge-sparrow.—In the beginning of November, a friend of mine was witness of a fight between a rat and a hedge-sparrow. The sparrow acted on the offensive as well as on the defensive, by striking the rat on the head with its beak. On hearing my friend approach, the sparrow flew away, and the rat, of course, disappeared among the bushes. What could have been the cause of this fight? It was too late for the sparrow to have young or eggs to defend; and I am at a loss for any other reason for her attack on the rat. It evidently could not be in self-defence, for she could fly away as well at first as at last.—*Y. Dec.* 1829.

The Càvia Cobdya, or Guinea-pig (in answer to C. Lamb, Vol. II. p. 205.), is a native of Guinea and the Brazils, where it is generally of a pure white colour, and seldom variegated with orange and black, in irregular blotches, as in England. They dwell in warrens, like rabbits, whom, in their food and manner of living, they strongly resemble; and would, without doubt, be speedily extirpated by the smaller kinds of cats, in which their country so greatly abounds, were it not for the rapid and almost incredible multiplication of their species, six hundred, on an average, being annnally produced from each female. In confinement, their food consists of the most juicy and succulent herbs; they will also eat bread sopped in milk, grains and fruits of all sorts, especially apples: and here it may be well to correct an error of Buffon's, who states, "that, though perpetually throwing out urine, *they never drink*." This, however, is not the case; for all those that I have seen have always manifested a strong inclination for drinking, being particularly fond of milk, and never refusing water when offered them. Their sleep is short and frequent; they utter a shrill piercing cry when in want of any thing, or when any one approaches near them, and frequently perish from cold, moisture, or want of exercise. On the whole, they are extremely timid, delicate, and feeble, but inoffensive, docile, and elegant: useless for food, in this country, at least, or for any of the purposes to which domesticated animals are generally applied, but very well adapted, from their gentleness and beauty, to be kept as pets.—*Perceval Hunter. June* 4. 1829.

The Night-Jar, or Goatsucker.—Is it generally known that the Night-Jar, or Goatsucker (*Caprimúlgus* europæ̀us), is reared in the manner of the cuckoo? At least, one circumstance of the kind has occurred within my knowledge. Last spring, a large bird was observed to visit a hedge contiguous to the road-side, and enclosing a garden at Newington, near Sittingbourne, Kent. It was soon remarked that a hedge-sparrow had built her nest there, and that there was an egg of a larger size than hers, and of a different colour, in the nest. The incubation was watched, and a stranger of larger dimensions than the progeny of the hedge-sparrow was hatched with her own offspring. In a short time the intruder grew so fast that it occupied the whole nest itself, having previously ejected the young of the rightful owner. When the bird was fledged, and nearly ready to take wing, it was placed in a cage, supposing it to be a young cuckoo; but, as the plumage became perfected, it proved itself a night-jar. I am not aware that a similar circumstance of this bird has been recorded.—*W. Masters, Curator of the Canterbury Museum. Jan.* 3. 1830.

Softening the Skins of Birds (in answer to J. A. H.).—The skin should be thrown into a vessel of sufficient capacity to admit it without bending, and be covered with water free from any brackish properties: to effect which, it must be sunk by weights attached to the bill and feet. It must be suffered to remain until perfectly saturated and softened, which may be considered to be accomplished when the toes can be straightened, and the bill opened with gentle force. I have found 18 hours to be sufficient for the largest birds, and 3 or 4 for the smallest. The skin must then be hung up by the beak for a short time, to allow the water to drain off, and must afterwards be completely buried, for at least 12 hours, in plaster of Paris. This will come off in large flakes or cakes on being touched, and any small remaining particles are easily brushed off with a feather. I have invariably found the skin to be much benefited by this process, and to have every appearance of being fresh taken from the body. The plaster of Paris, at least the crusted parts, cannot be used a second time. I strongly recommend the use of plaster of Paris in skinning birds: it keeps the skin clean, by absorbing the blood and grease, which might otherwise come in contact with the feathers. — *Edward P. Thompson. Dec.* 8. 1829.

The Cuckoo. — To what country does the cuckoo migrate during our autumn and winter, and does she lay her single egg in her new abode, as she does here? — *W. H. White. Bedford, Nov.* 25. 1829.

The Missel Thrush.—Sir, I should be glad to enquire, through the medium of your valuable Magazine, if any of your correspondents has ever taken the trouble to ascertain whether the missel-thrush (*Túrdus* viscívorus) is to be classed among the number of our songsters. I believe it to be the generally received opinion that it is *not*, and a very close observer of nature (the author of *The Journal of a Naturalist*) remarks that "it seems to have no song, no voice, but a harsh predictive note;" as if he alluded merely tó that harsh grating cry which they often utter, and especially when collected together in numbers during the autumn. I have also spoken to several persons on the subject, who have given their attention to the notes of birds, and have scarcely met with one who does not consider the bird in question to be totally devoid of song, and to be no more a contributor to the music of the woods than the jay or magpie. Now, in spite of all this united evidence against me, I am bold enough to maintain that it has a perfect song, and shall be extremely gratified to find any one who will bear me out in this assertion. I have never been able to approach the bird while in the act of singing, since from its always selecting the summit of a tree for that purpose, and being of a very shy disposition, it has always flown off before I could get near enough to inspect it; but from its peculiar darting mode of flying, I am convinced in my own mind that it was the missel-thrush. The note resembles that of the blackbird more than the common thrush, and is, I believe, generally mistaken for the former; but it is much louder and less mellow, and free from that warbling nature so peculiar to the blackbird. Its song seems to consist of only three or four notes, which it continues to repeat over and over again, for, perhaps, half an hour together, with scarcely any variation, pausing for a second between every stave, till the ear is almost wearied with its monotony: on which account it gives one more the idea of being a *young blackbird* which has not yet acquired its perfect song. It also begins to sing much earlier in the year than either the thrush or blackbird, and generally in very wild cold weather. I remember once, in particular, hearing it in the week after Christmas-day in the year 1827, when the trees were loaded with one of the heaviest hoar-frosts I ever witnessed, singing as merrily as if it had mistaken the snowy covering for the more grateful shape of the summer foliage. There also appeared to be another in the distance, which continued to answer it for some time. It generally discontinued its song at the end of May, but I have heard it this year as late as the end of June. I am, Sir, &c.—*J. B. Aug.* 4. 1829.

Túrdus mùsicus. — I have often been surprised on finding a quantity of snail-shells, broken into small bits, chiefly the Hèlix nemoràlis, on a bank in my garden, lying about a stone; and it was not till very lately that I was able to account for the manner of their coming there. I then saw a throstle (*Túrdus mùsicus*) in the act of breaking a shell against a stone, in order to obtain the snail. From this circumstance, I should conceive the snail to afford a plentiful supply of food for this species of bird during the winter season; or during a scarcity of worms or insects, on which I have always considered them to subsist. Some of your able correspondents will, probably, be able to give some further information on the food of this species of bird. — *W. H. White. Bedford Nov.* 25. 1829.

Facts and Queries as to Birds in the West of Scotland. —*Lóxia curviróstra.* In winter 1828-9, the crossbill was seen in small flocks in the larch woods in this neighbourhood. I obtained two specimens, male and female: the male of a rose colour; the female, yellowish green. (*Bewick's British Birds*, 1809, vol. i. p. 154.) It has been said that the crossbill followed the apple into England. Has this species of bird followed the larch into Scotland?

Emberìza nivàlis. During the same winter, I got specimens, male and female, of the snowflake, shot in this neighbourhood.

Mérgus albéllus. — Also a fine specimen of the male bird. smew, or white nun, killed on the beach near Prestwick church. The hen bird was also shot, and is preserved in the neighbourhood.

A'mpelis gárrulus? There were also killed in this county, last winter, several birds which were called Bohemian chatterers. I did not see any of them, but they were described as being remarkably beautiful. Is this the *chatterer* of Bewick (*A'*mpelis g*á*rrulus)?

A'nas Cýgnus fèrus. Within this last fortnight, several flocks of swans (the wild, I presume) have been observed, from which the country people prognosticate a severe winter; and already a decided frost seems to have set in.

Colýmbus. I saw a bird which was shot the other day on this coast, and which I had not seen before: it appears to be a guillemot. Not having an opportunity of comparing it with Bewick's description, I cannot say whether it be his guillemot, lesser guillemot, or spotted guillemot. The bill appeared to me to be black, and the legs reddish; the wings were black.

Can I be informed, through the medium of your interesting Periodical, whether there is any more modern work that now comes in place of Bewick's *British Birds*, and what is the latest edition of Bewick. I am, Sir, yours, &c. — *Z. Z. Ayr, Dec.* 19. 1829.

Hirúndines. — Do the swallows migrate to the south of Europe, or do they cross the Mediterranean into Africa? Do they propagate their species there as well as here? —*W. H. White. Bedford, Nov.* 25. 1829.

A remarkable Vanéssa I'o.—Sir, I have in my possession a specimen of the Van*é*ss*a* I'*o*, which I took in 1827, that is entirely destitute of the eyes on the inferior wings, as well as of the dark ground they are placed on, and the light-coloured circle that surrounds them. That they were not rubbed off in taking, I am sure, as the specimen is in most capital preservation. Having made numerous enquiries in this neighbourhood, I cannot meet with any one who has either taken or seen a similar insect before. I shall, therefore, be glad to hear further information of it from some of your numerous correspondents. I am, Sir, &c.—*H. S. Smith. Leeds, October,* 1829.

The Nidus attached to a Reed (p. 94.) is evidently the production of a species of wasp; I am inclined to think, the *V*éspa holsática, mentioned in Kirby and Spence's *Entomology*, vol. i. p. 504. I should have felt quite certain of this, if the inner coat of the one in question had not been shorter than the middle one, which is not quite accordant with the description given by those authors; yet I am inclined to consider this an accidental variance, possibly owing to the nidus not being fully completed; for, possibly, if another tier of cells had been added, the inner covering might then have been extended: or perhaps the nature of the shelter in which the nidus was placed may have rendered the extension of the inner covering unnecessary; for, though there is great uniformity in the nidus built by each individual of each distinct species of insect, yet, under varying circumstances, they will at times vary their plan of operation, as Huber proved by his experiments on bees. — *John Thompson. Hull, Jan.* 11. 1830. P.476. ol.10. x

Nidus attached to a Reed. — Sir, In answer to your correspondent G. M. (p 94.), I should suppose the "nidus attached to a reed" to be the nest of the solitary wasp (*Vèspa* campanària), of which an account is given in that interesting work the *Journal of a Naturalist*, p. 333., as well as a plate at the end of the book. I am, Sir, &c. — *W. H., R.N. Yeovil, Jan.* 13. 1830.

A curious Ball containing Bees. — One of your correspondents in the Magazine of Natural History (Vol. II. p. 404.) requests information respecting "a curious ball containing bees," which he found suspended from the roof of a hen-house; and, as I see no reply to his enquiry in the November Number, from a more able hand, I venture to send you the following account, accompanied with a sketch (*fig.* 39.) of a similar nest, which will, perhaps, satisfy his curiosity. About three years ago, I found a deserted habitation, of very delicate structure, and of a greyish colour, adhering to the ceiling of a verandah, which was overgrown with the purple *Clématis*. The texture was very like that of thin unsized (blotting) paper; and I was quite at a loss to guess by what insect it had been constructed, till I met with an account of it in Rees's *Cyclopædia* (article *Véspa*), in which, on the authority of M. Latreille, it is attributed to the workmanship of the *Véspa* holsática of Fabricius. Since that time I have seen a more accurate description of it in the *Journal of a Naturalist*. The intelligent, though unknown [L. Knapp, Esq., F.L.S.], author, speaking of the variety and delicate construction of the nests of insects, says: — "Among those with which I am acquainted, none pleases me more than that of a *solitary* wasp (*Véspa* campanària) which occasionally visits us here. It is not a common insect; but I have met with their nests: one was fixed beneath a piece of oak bark placed in a pile; another was pendent in the hollow of a bank of earth. The materials which composed these abodes seemed to be particles scraped or torn from the dry parts of the willow, sallow, or some such soft wood, and cemented again by animal glue, very similar in texture to that provided by the common wasp, which makes great use of the half-decayed wood of the ash, and will penetrate through crevices in the bark, to abrade away the dry wood beneath. They seem to have but small families, ten or twelve cells only being provided. These are situated at the bottom of an egg-shaped cup, contracted at the lower end, where an orifice is left for the entrance. This, again, is covered in the part where the cells are placed, by a loose hood or shed, extending about half way down the inner one. The pendent situation of the whole, and this external hood, round which the air has a free circulation, are admirably contrived for securing the cells from injury by water. The nest, when hanging in its proper situation, is like the commencement of some paper-work flower, and can never be observed but with admiration of the elegance of its structure; and the unusual appearance of the whole must excite the attention of the most incurious observer of such things." If you consider these particulars worthy a place in the Magazine, they are quite at your service; and I beg to remain, Sir, yours, &c. — *Wm. Stowe. Buckingham, Dec.* 4. 1829.

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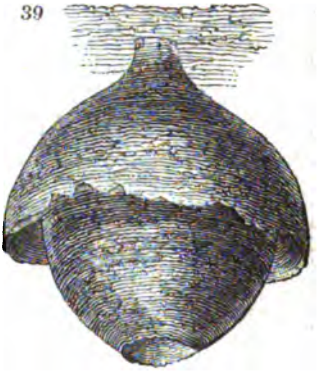


Curious Property of a Fly's Eye. — Goldsmith, in his *Animated Nature*, mentions the fact of an experiment made upon a fly's eye, placed in such a position that objects might be seen through it, by means of a microscope; when it was discovered, that the power it possessed of multiplying and diminishing objects was incalculable; so that a single soldier, when viewed through it, appeared a whole army of pygmies. Is it likely that the fly itself sees in this manner, or can the powers of the human eye itself have any thing to do with this extraordinary appearance? — *M. Jan.* 1830.

Skate Spawn. — In answer to the query of Mr. Brown of Boston (p. 93), I should say there can be no doubt that the transparent jelly-like masses, which he describes as so frequently cast on the shore near Boston, are a species of the Medùsa; most likely Medùsa aurìta, I should conceive, from his description, or probably Medùsa capitàta, though I should think the former. As Mr. Brown seems to be an inhabitant of the sea coast, I am surprised at his not having seen these animals in motion more than once; for I, who only very seldom see the sea, have noticed hundreds of the Medùsa aurìta moving in the manner he describes off the coast of Scarborough. The Greenland captains here inform us that a very minute species of this animal, and a kind of small shrimp, which are found in myriads in the Greenland seas, form the principal food of the whale. — *John Thompson. Hull, Jan.* 11. 1830.

The Samlet, Botcher, and Gillion. (p. 94.) — Sir, I offer a few remarks, in reply to Mr. Hawkins's enquiry, whether the *samlet* ever becomes a salmon. The ready answer is, that the samlet is a perfectly distinct species of fish, propagating its kind like all other species; having a regular course of existence proper to itself, and being connected with the salmon no otherwise than their being generally found together in the same rivers: and yet your correspondent is fully justified in putting the question, for a great deal of mystery and misconception have prevailed as to the origin and ultimate destiny of the fish in question; and purporting to remove these, in the present remarks, it will require going pretty freely into the natural history of the case.

The *Samlet* is a small fish, from 6 to 8 in. in length, and 3 or 4 oz. in weight, distinguishable from a fresh-water trout of the same size, chiefly by a row of light blue blotches down each side. Its natural element is the sea, but, like most of the salmon genus, it annually ascends our rivers, almost to their sources, and for the same purpose in all; that of depositing their spawn in the gravelly beds of the streams, far from the many marine enemies which would entirely devour the whole, if lodged in the gravel and sands of the shores. It ascends the rivers in autumn, and disappears from them in winter; and very probably that appearance and disappearance have been the source of the many strange and absurd opinions entertained at different periods concerning it, as well as the numerous local names given to it. In this neighbourhood it is called a Wrack-rider, from its appearing in autumn when the streams are full of wrack, and frequently rising to the angler's fly from those vegetable beds. In Cumberland it is called a Brandling; in the higher course of the Severn a Laspring; and in Wales, and many other parts of England and Scotland, it has other local names; and these, again, have tended to increase the confusion accompanying its natural history. The circumstance, too, of its beeing found in most of the rivers frequented by the salmon, has originated many of the wild notions connecting it with that fish. It was long believed to be a spurious brood of the salmon, incapable of propagation, by the whole race being of one sex; a monstrous anomaly, unworthy of the meanest naturalist, by admitting that the many millions which annually enter our rivers were the constant blundering productions of a power so undeviatingly correct in all its other infinity of progeny.

It is universally true, that all anomalous productions in organic nature are limited to individuals, and never extend into a general and continuous succession. That absurd notion was followed by one equally groundless, that samlets were the young fry of salmon, and ultimately grew up into that fish. The case is easily refuted. Samlets abound in our rivers only in autumn, when the salmon are mostly ascending to deposit their spawn many weeks subsequently; and that spawn is not animated into a fish of the size of a samlet until the following March and April, when the rivers swarm with them, and when no trace of the samlet remains. To the practised angler, the young salmon and samlet are as distinctly known from each other as the chicken and duckling. The fisherman's account, mentioned by Mr. Hawkins, of having wired the tail of a samlet, and afterwards found it a salmon, is utterly unworthy of the least credit. In all cases of mysteries, the delusion is kept up by similar idle stories. The tail of fish is the sole instrument of propulsion, and in so small a one as the samlet, a very moderate piece of wire would soon exhaust and destroy it. The number of salmon entering the Severn is probably less than as one to five hundred of the samlets, and the same little fish of two or three ounces, returning a dozen pounds in weight, into the hands of the same individual, and at the same local situation, holds out such a chain of improbabilities, as to furnish another striking instance of the easy credence which absurdities obtain in the absence of understanding. In former times, when ghosts were in fashion, every parish had its particular histories of the nightly wanderings of some of its former residents; and these midnight itinerants, like the fisherman's samlet, never showed themselves to more than a single witness at a time. These fooleries have passed away; but, stranger yet, natural history still abounds with its spectral phantoms of upas trees, serpent fascinations, innate instincts, and numerous others.

In Mr. Hawkins's other query, as to whether *the Botcher, the Gillion, and the Salmon* are merely varieties or the same fish, a direct answer cannot be given; the first two names being strictly local, and affording no means of knowing what sorts of fish are really intended. A short notice, however, of the natural habitudes of the salmon, will be quite sufficient to solve the case. The natural element of the salmon, as observed before, is the sea. There only is to be found in abundance that natural and nutritious food which promotes his early and rapid growth, and restores his wasted frame from the extreme exhaustion, generally amounting to half its original weight, in which it always returns from fresh into salt water. The safe propagation of the species requires that the spawn should be deposited and covered up in beds of gravel, at the bottom of running water; and were than done in the shores of the ocean, the whole would be soon rooted up and devoured by crabs, flounders, sand eels, shell-fish, and many other hungry depredators, always in search of food in such situations. In the streams of rivers there are no such enemies; and hence it is, and solely on that account, that the old fish annually quit the element, so healthy and congenial to their nature, for one wherein, from entering it, they experience so much of privation and waste. In that situation the spawn safely progresses into life, and the young attain a size and activity enabling them to pass down into their natural element with powers of escape from their many marine pursuers. The spawn is deposited in the last three months of the year, and in March and April the young are several inches in length. The same young fish return back into the rivers in August, September, and October, and are then called Gilses, and so wonderfully rapid has their growth been, that the same fish, which in March weighed two or three ounces, weigh as gilse, from six to eight or ten pounds; an increase, in so short a period, of fifty times the original weight. The gilse, on their second visit into fresh water, are deemed salmon. Such is the simple history of this noble fish, and it brushes away all the silly anomalous blunderings of mixing it up and mystifying it with other species.

A very singular instance of the kind occurs in a quarter the least to be expected of all others. The late lamented and highly gifted President of the Royal Society, in his *Salmonia*, intimates that the sea-trout, here called a Bull-trout, is probably derived from the fresh-water trout. The probability is wholly groundless; for no two species can be more distinctly separate. The sea, or bull, trout, very abundant in this country, passes through a routine of existence precisely similar to that of the salmon, and even matches it in size, sometimes attaining a weight of more than twenty pounds, but it is very inferior for the table. A third distinct species, of the same genus and habitudes, but much less in size, weighing only from two to three pounds, also abounds here, called a Whitling, and having many other local names in other places. It is an excellent fish for the table, and one of the most nimble and amusing on the angle line, running with great force, and often leaping 3 or 4 ft. above the water. All these marine emigrants are rapidly decreasing from the great destruction of them in fresh water. A salmon is only fit for the table in the first two or three weeks after quitting the sea; and, after spawning, it is not only unwholesome, but actually poisonous, and yet during the whole of its sojourn in the rivers it is destroyed unlimitedly by poachers and others. I am, Sir, &c. — *J. Carr. Jan.* 1830.

Crabs abound in the eastern Parts of Jamaica at all Seasons, but are best in the months which have an R in their names, as April, &c, They are most abundant in May, when they deposit their eggs, or run, as the Negroes call it. At this season it is impossible to keep them even out of the bedrooms, where, at one time scratching with their large claws, at another rattling across the floor, they make a noise which might alarm or startle a stranger. For a few weeks in this season they may be gathered in any number. Even the hogs catch them, though not always with impunity, as a crab sometimes lays hold of one of them by the snout, from which he is not easily disengaged, and the terrified animal runs about squeaking in great distress. At other seasons, and when more valuable, they are caught by torch-light at night, and put into covered baskets. Crowds of Negroes pass my house every evening, with torches and baskets, going to a crab-wood on the other side, and return before midnight fully laden. Their baskets contain about forty crabs, and the regular price is a five-penny piece, our smallest coin, equal to about 3½*d.* sterling, for five or six crabs. A hundred plantains, generally sold for 5*s.*, will purchase sixty or seventy crabs. Two of these eaten with plantains, or yams make an excellent meal. I have seen upwards of a hundred Negroes pass my house on an evening, and return with their baskets not only full, but with quantities of crabs fastened by the claws on the top of the baskets; they must have had at least 3000 crabs. Almost every Negro family has an old flour-barrel, pierced with holes, in which the crabs are kept. They are fed with plantain skins, &c., and taken out as wanted.

There is a great variety of crabs in Jamaica, but only two are eaten. The black is the best, and is one of the greatest West Indian delicacies, hardly less so than the turtle. They live in mountain forests, in strong ground, and feed on the fallen dry leaves of the trees. The white crab, as it is called (though rather purple than white), principally used by the Negroes, but also by the Whites, is larger, and resembles the lobster in taste. These are amphibious, and are found in the low lands, principally in the woods, where, as I have already said, they are caught at night with torches. They are numerous also in cultivated fields, and in some of the low-lying estates do considerable injury at times to the planters in dry weather, when vegetation is slow, by nipping off the blade of the young canes and corn as it shoots through the ground. In such situations the Negroes catch them in a singular manner. They know from the appearance of a crab-hole, if there is a crab in it, and dig down till they come to the water, say 18 in. or 2 ft. and then close the hole firmly with a handful of dry grass; in this manner one Negro will stop two dozen holes in a morning. About four hours after he returns, and his prisoners being by this time *drunkened* (half-drowned), they tumbled out along with the plug of grass and are caught.

In 1811 there was a very extraordinary production of black crabs in the eastern part of Jamaica. In June or July the whole district of Mauchioneal was covered with countless millions, swarming from the sea to the mountains. Of this I was an eye-witness. On ascending Oua Hill, from the vale of Plantain Garden River, the road appeared of a reddish colour, as if strewed with brick-dust. It was owing to myriads of young black crabs, about the size of the nail of a man's finger, moving at a pretty quick pace direct for the mountains. I rode along the coast a distance of about fifteen miles, and found it nearly the same the whole way; only in some places they were more numerous, in others less so. Returning the following day, I found the road still covered with them, the same as the day before. How have they been produced, and where do they come from? were questions every body asked, and nobody could answer. It is well known that crabs deposit their eggs once a year, in May; but, except on this occasion, though living on the coast, I had never seen above a dozen young crabs together, and here were millions. No unusual number of old crabs had been observed in that season; and it is observable that they were moving from a rock-bound coast of inaccessible cliffs, the abode of sea birds, and exposed to the constant influence of the trade winds. No person, as far as I know, ever saw the like except on that occasion; and I have understood that, since 1811, black crabs have been abundant farther in the interior of the island than they were ever known before. (*Jamaica Royal Gazette*, March, 1829.) — Can you or any of your readers tell how many of the above crabs are described? — *X. Y. June*, 1829.

Night-smelling Plants. — Can any of your correspondents inform me why the flowers of the night-smelling plants, such as Cheiránthus trístis, Pelargònium filipendulifòlium, P. gibbòsum, &c. &c., are all of dark or dingy colours? — *Anon. July* 1829.

Senècio lívidus and sylváticus. — Sir, Can you or any of your numerous correspondents inform me of the true specific distinction between *S*enècio lívidus, and *S*enècio sylváticus; since, though I have frequently examined the plants so called for that purpose, I have never been able to discover any satisfactory difference between them. The various situations in which I have gathered them preclude the possibility of their specific characters, if such really exist, from being unobserved. I have specimens from the sea coast, from the Hambledon Hills, where I gathered it in great abundance this summer, in a field of oats, growing with Rhinánthus màjor, and nearly obliterating the crop; also in some woods in this neighbourhood. The different authors whom I have consulted on the subject give, as the specific difference, the green tips of the calyx scales in *S*enècio lívidus. Now, in all my specimens, the tips, on their first coming out of the flowers are green, but in their advanced state are perfectly discoloured. I should be obliged if any of your correspondents would give me their opinions on the subject, since I feel almost convinced that they are the same species. — *H. D. Richmond, Yorkshire, Nov.* 24. 1829.

Marine Vegetables as Articles of Food. (Vol. II. p. 106.) — Mr. Charles Greaves having called upon botanists to direct their attention to marine vegetables as articles of food, it may be advantageous to point out the amount of our present knowledge upon this subject. The kinds as yet generally known to be resorted to as articles of diet are but few, viz. *U'*lva umbilicàta, *F*ùcus esculéntus, edùlis, and saccharìnus, and a species found on the coast of some of the islands in the Indian Ocean. Besides these, a second species of *U'*lva, resembling a small brown lettuce, and *F*ùcus vesiculòsus are converted into an inferior kind of food by the poor people on the southern coast of Ireland, while those on the western extract a superior and more nutritive kind of sustenance from the fronds of the *F*ùcus críspus. The wretched people, who are necessitated to have recourse to such coarse and nauseous food as the pounded substance of the *F*ùcus vesiculòsus and saccharìnus, are neither to be envied nor imitated; but the jelly obtained by boiling the Javanese plant, and the *F*ùcus críspus, when properly saved and prepared, are not to be despised, nor the mess procured by stewing and chopping the *U'*lva umbilicàta, and known by the name of stoke or laver. — *T. J.*

Preserving A'*lgæ, and collecting* Fùci. — I shall be glad if some of your readers will instruct me as to the best method of preserving the *A'*lgæ, and making them retain their colour. I should also be glad to learn what is the best month for collecting the different specimens of British *F*ùci, and any other information relative to this pleasing pursuit. Is there any work upon the subject, with coloured plates, less expensive than the recent splendid production of Mr. Dawson Turner? — *C. N. Jan.* 14. 1830.

Limestone Quarries at Ledbury. — Sir, Having received much gratification from the perusal of your able correspondent Mr. Jukes's remarks on the trilobites at Barr and Dudley, and perceiving that he expresses (Vol. II. p. 233.) a wish for some information relative to the limestone at Ledbury in Herefordshire, I took the opportunity of a few days' residence in the neighbourhood to examine the quarries, and beg to enclose the specimens I then obtained, trusting they may prove in some degree useful.

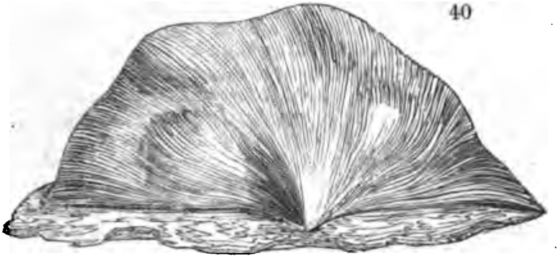
I find that there are two strata of limestone quarried at Ledbury: an upper ferruginous stratum, abounding with shells and alcyonia; and an under, darker, and more compact stratum, of a crystalline nature. It is in the *upper* limestone bed that the trilobites are *principally* found, though a few have been, and still are, occasionally discovered in the *lower* stratum; but the principal workman there assured me that it was more than two years ago since any *perfect* ones had been found there. I could neither hear nor see any thing of the large trilobite, except the indefinite statement, that larger ones than ordinary were very rarely found. I have sent with this letter a few specimens of the imperfect trilobites I obtained, with a perfect one of a different species, which I trust will be sufficient for the purposes of identification. Whether the four specimens which I send are the tail part of the A'saphus caudàtus or not, I leave you to say; they are certainly much broader in proportion to their length than the figure given Vol. II. p. 43., and some are so much so as to give them the appearance of a *butterfly*, the name by which they are popularly known among the workmen. At any rate, this is the trilobite, the lower portions of which are found abundantly here, but the upper parts are quite scarce, and I was unable to obtain even one. They were formerly more abundant, a workman of the upper stratum informed me, but as they are now deeper in the bed, they rarely find them.

The small trilobite, in transition limestone, which I send herewith, and which, I understand, is scarce in the Ledbury quarries, I trust, will prove worthy your attention, as it is nearly, if not quite, perfect, and it is extremely simple in its form. This, I believe, is from the under stratum; and I could not hear that any other trilobites were to be found here. I likewise send you a large shell from the upper stratum.

The geology of this part of the country seems at present to be but little understood, though it well deserves attention. At the distance of four miles the primitive chain of the Malvern Hills lift their numerous heads like mountain waves terminating a verdant ocean, and a beautiful vale intervenes between them and the limestone eminences, which for a considerable distance run parallel with them. At the north end of the Malvern chain the limestone hills lie grouped apparently in much confusion, a chain, however, extending to the north, towards the Abberley Hills; but the romantic valley of the Teme intervenes; and at Knightsford the river rushes swiftly along at the base of an immense and nearly perpendicular conglomerate rock, upwards of 200 ft. high. Little research has been made into the subterraneous treasures of this district, but a shaft is now being sunk at Cradley, about two miles from Great Malvern, which may probably throw some light upon the subject. — *Edwin Lees. Hunter's Hall, near Little Malvern, Sept.* 15. 1829

The Lime-Works at Colwall.—Since writing the above I have visited the lime-works at Colwall, close to the base of the Malvern range, on the western side, and about a quarter of a mile from a road cut through the hills, called the Wych. The transition limestone here abuts against the range, and various limestone eminences appear, stretching in a confused manner northwards to Cradley, where, as I before observed, a shaft is now being sunk, in the expectation of finding coal. The stratum of limestone at Colwall dips to the west, and is evidently a different bed from that at Ledbury, which is four miles to the south-west, the fossils here being different from those at Ledbury. I noticed many corallites, with some fine specimens of chain coral, lying about near the quarry, and the stone in the upper part of the bed is in many places abundantly covered with minute zoophytes, in the manner of the Dudley specimens, but unattended by trilobites; however, in a stone from the lower part of the stratum, I observed a small specimen of the Dudley trilobite (Calymène Blumenbàchii), but I neither saw nor heard of the trilobite popularly known among the men as the butterfly (A'saphus caudàtus). In a hole of a neglected part of the quarry, I saw a large orthoceratite; which, though not perfect, appeared to me to resemble the Orthóceras striàta, as figured in Vol. II. p. 232. fig. 68.

The Carboniferous Limestone near the Wrekin.—I take this opportunity of sending a remarkable fossil shell, from the carboniferous limestone in the vicinity of the Wrekin, near Wellington, in Shropshire; it is known among the workmen by the name Owl's-head (*fig.* 40.), the protuberances and curve of the shell, when held up, giving a rude representation of the head, eyes, and beak of that bird. — *Id.*



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The posterior segments of trilobites, of which there are three specimens, certainly belong to A'saphus caudàtus; the fourth specimen, which is said to be a complete animal, is only the central lobe of the anterior segment of the same species of animal, that is, the portion between the eyes. The large shell, if it is a shell, is new to me; it may possibly be the surface of a coral. The small shell is, I think, Nerìta spiràta, *Min. Conch.*, 463. The Owl's head is the cast of the interior of a Prodúcta, nearly like Prodúcta personàta of *Mineral Conchology.* — *J. D. C. S.*

Our correspondent may find some accurate details of the Malvern district, illustrated by maps, in the *Transactions of the Geological Society*, where he will observe that the highly interesting peculiarities displayed in this quarter have by no means escaped the accurate investigation of men of science. In Coneybeare and Phillips's *Geology*, a work which cannot be too highly commended to the perusal of geological students, are some notes relative to the same district. The great and the reduced geological maps of England and Wales also exhibit the boundaries of the formations to which the notice of our correspondent has reference. We fear the trial for coal at Cradley will be ineffectual; at all events, the details of the strata through which the shaft passes will be interesting if it can be communicated to us.

The specimens of organic remains, furnished by Mr. Lees, are scarcely perfect or characteristic enough to answer the purpose of engraving. Should such be met with, and they be sent to us, they shall be figured. As references to most of these fossils should in due time be found in this Magazine, it is desirable that the figures should be taken, when practicable, from specimens that are not mutilated. — *R. C. T.*

A Mass of fused Green Porphyry has been received from Mr. John Brown of Castle Hill, Colchester. To produce complete fusion, the mass was broken to the size of small peas. A large fragment, subjected to the same degree of heat as the small fragments, was merely vitrified on the surface. Mr. Brown is desirous of knowing whether experiments of this kind have been frequently made before. — *John Brown. Castle Hill, Colchester, Dec.* 8. 1829.

A very unusual Appearance in the Sky. — Dear Sir, I was travelling on the evening of the 10th of July, along the high road between Quatre Bras and Namur, when a very unusual appearance in the sky attracted the notice of myself and of fourteen or fifteen other persons, fellow-passengers in the diligence. As I have never met with the mention of a similar phenomenon, I have thought fit to trouble you with a memorandum of it, in the hope that some of your scientific correspondents may be induced to explain it in a more satisfactory way than I have attempted below. The day had been, till two hours after noon, extremely wet, and rain had fallen previously to that time, for twenty-three hours; the whole country, in fact, had been deluged with rain for many weeks: consequently, the exhalations were continual and excessive, and the air filled with vapour. The evening of the 10th was, however, full of promise of some coming change; and the clouds began to move off about three o'clock, P.M., before a strong breeze from the S.E. At six we had got beyond the line of those gentle acclivities in the neighbourhood of Ligny and Sombreffe (celebrated in the battles of June, 1815), and had obtained a prospect over the extensive open country beyond the little valley of the Orneau. It is at Mazy where the range of hills at the back of the Meuse first bound the horizon; and it was at Mazy that we first saw the appearance in question. The sun was nearly behind us; but, in the direction of the Meuse, from which we were distant nearly 3½ Brabant leagues (say 11 English miles), we distinctly saw rays of light, as of the sun, issuing from a low bank of clouds, which seemed to be stationary and to hang over the valley of the river, and piercing the intermediate clouds (as openings occurred in the course of their separation from each other), in long diverging lines stretching towards the meridian, so as to give the idea of a *rising sun*, and in the same manner as I have seen him rising in a cloudy morning over the same country. So strong was the resemblance to that of the sunbeams, that one might easily have imagined we were travelling directly contrary to our route. It occurred to me, that it might be the reflection of the actual sunbeams from the surface of the Meuse, refracted by a body of vapour, which again reflected them in a line nearly parallel with that of their incidence. The rays were broad and well defined, of a whitish light, and diverging from a centre which seemed luminous, and had such an appearance as the sun would have if behind a cloud, such, indeed, as the sun actually had at the time, in the opposite quarter of the heavens. If the Meuse be supposed too far for us to have seen a reflection from it, even in that bold and open country where the eye ranges over an uninterrupted sweep of woodland and meadows, might not the phenomenon I allude to have been caused by the simple reflection of the sun from a cloud? but as the clouds were not quite stationary, that supposition is not likely to be the correct one.

These mock sunbeams lasted nearly half an hour, when they disappeared instantaneously. The following day was beautifully clear, and the air so calm and warm, that a party of ladies, whom I joined at Namur, preferred floating down the Meuse to Liege in a boat, to a land journey on the excellent road which runs along the banks of the river; but the following days were wet and stormy, the general character of the month of July this year, wherever, in the course of a long journey, I happened to be. I merely mention this casually as a note on the weather. I am, Sir, &c. — *W. B. Clarke. East Bergholt, Oct.* 5. 1829.

The Cause of Mirage. — I offer the following supposition as to the cause of the appearance called the mirage, with great humility, if new: — 1. The great heat of the sun draws up the moisture in vapour from the depths of the earth. 2. The same heat so rarefies the atmosphere, as to make it too light to bear the vapour, and consequently it remains hanging on the surface, being still kept in vapour by the great heat reflected by the hot sands. — *Y. Dec.* 1829.

Electricity. — Can you, through your excellent work, afford your readers some information on the subject of electricity, which (I speak from knowledge) would be highly gratifying to some of the junior branches of the families who take it in. Why are flannels and silks more apt to emit sparks this frosty weather than any other substances? An explanation from any of your correspondents of these and other electrical appearances of the same nature would oblige, Yours, &c. — *M. Jan.* 1830.

Effects of Heat and Cold relatively to Vision. — Sir, It has appeared to me, from various cases mentioned by writers, that cold, while it (by condensing substance) diminishes *actual* size, and magnifies *apparent* space; and that heat, while it enlarges actual size, diminishes apparent size or space. Take the following from among many:—1. As to cold, Captain Parry says, "We had frequent occasion to remark, in our walks, the deception which takes place in estimating the distance and size of objects, when viewed over an unvaried surface of snow. It was not uncommon for us to direct our steps towards what appeared a large piece of stone, at about a mile's distance, but which we could take in our hand after about a minute's walk; nor did we find the deception less on account of its frequency." (*Northern Voyages.*) In this case I think that it was not the uniform surface of the snow which caused the appearance; for, had it been, I think, custom would have got used to it, and that it would not any longer deceive them: but, I am inclined to think, it proceeded from the condensed state of the air by cold, at least in part. I do not think that the surface being uniform in general would produce so great an effect, without some other helping cause. The reason why the distance, as well as the object, is evident, for the same cause would affect both, apparent space only being magnified; and that the same, whether full or empty, occupied or unoccupied, only in the first case our senses cannot perceive it. — 2. As to heat: "Every one who has resided in a southern climate, knows how much the purity of the atmosphere tends to diminish apparent distance. I never saw it produce this effect in so extraordinary a degree as at Mexico (the city). The whole valley is surrounded with mountains, most of which are at least 15 miles from the capital; yet, on looking down any of the principal streets, it appears directly terminated by a mass of rocks." (*Ward's Travels in Mexico.*) How is it that the apparent distance was diminished? I should think that the apparent size of the mountains was also diminished. This appears to me to be implied by speaking of the mountains as looking like a mass of rocks. Query, Is this the effect of the cold causing the atmosphere to act as a concave mirror (by condensation), and heat causing it to act as a convex mirror (by expansion). — *Y Dec.* 1829.

Singular Phenomenon. — Sir, I observed a singular effect this morning, when looking at the snow in my garden, from the drawing-room window. The external cold had condensed, in a slight degree, the vapour on the windows, but not sufficiently to be frozen. On looking through one of the panes, I remarked a beautiful rose-coloured tinge on all the trees and objects that were covered with snow, although the glass itself was perfectly transparent and colourless, and did not exhibit the same appearance in that part on which the vapour from the warmth of the room had not rested. The other panes, although equally obscured by the vapour, did not produce the same effect, the objects seen through them being of their natural colour. In a quarter of an hour later, on looking again through the same pane of glass, I observed a change in the colour, the objects that were covered with snow having assumed a greenish tinge, while the branches of the trees retained the same roseate, or now rather red-brown, hue, all the other parts of the window remaining as before. There was no sun, nor any apparent change in the state of the external atmosphere, the day being gloomy and rather foggy. This phenomenon was distinctly seen by others of the family, to whom I mentioned it, therefore could not proceed from any illusion in my own vision. I should much like to have it accounted for, if any of your correspondents can, from this imperfect description of so singular an appearance, ascertain its cause. I am, Sir, &c. — *L. F. Rue de Chaillot, Paris, Dec.* 22. 1829.

THE MAGAZINE

OF

NATURAL HISTORY.

MAY, 1830.

Art. I. *An Address delivered at the sixth and last Anniversary Meeting of the Zoological Club of the Linnean Society of London, on the 29th of November,* 1829. By N. A. Vigors, Esq. A.M. F.R.S. &c.

There are few among the friends whom I now see around me, who have not at some time experienced the bitterness of feeling that accompanies a last farewell. Even although the "accustomed spot," from which it may be our lot to be separated, may not recall to our recollection the most favourable associations, still the idea of never returning to it will elicit from us "a lingering look" as we part from it for ever. How much more deep must be the regret, at this moment, with which I take my leave of a Society endeared to me by every tie of friendship and kind feeling! Six years have this day elapsed since our club first existed as a scientific body; and when I look back upon the many hours during that length of period which I have passed in conjunction with it, I do not recognise one upon which I can dwell with aught but the liveliest pleasure. Much of friendly and intellectual intercourse, — much of valuable instruction, — much of that high sense of enjoyment which attends the pursuit of kindred studies in concert with kindred spirits,—is exhibited in that retrospect. A more than ordinary interest indeed unites me with this club. As a friend to the science it cultivates, I took an active part in its original formation; as your secretary for some years, I contributed an humble but a zealous share to its support; and as your chairman this year, I find the duty devolve upon me of pronouncing its requiem. Identified as I thus consider myself with your body, I trust, gentlemen, I shall receive credit from you for sincerity, when I again declare the heartfelt regret with which I announce, that, when this night

I shall have ceased to address you, our club will have ceased to exist.

These, however, are but the natural feelings to which we cannot avoid giving utterance, when submitting to any sacrifice which our better judgment pronounces to be expedient. The present sacrifice is on our part voluntary. We submit to it, or rather I should say we embrace it, because we conceive that we have attained the great object of our institution; and, that object once attained, there remains no further necessity for keeping in force the means which have achieved it. I need scarcely remind the friends who surround me, that this club was established at a period when zoology still languished under the unmerited neglect to which it had almost at all times been exposed in this country, and when a few disinterested votaries only of the science were found chivalrous enough to devote themselves to an unpopular and an unprofitable pursuit. The period, however, was auspicious in promise. A new impulse had begun to operate in every department of science. Whether it owed its origin to the change of events which allowed the minds of our countrymen to subside from the bustle of war and politics into the calmer arts of peace, — or whether to the increased intercourse with our Continental neighbours, and the consequent example set us by a people who at no time suffered even the more generally engrossing avocations of the field or the cabinet to supersede the interests of science, — whatever, in short, may have been the cause, certain it is that a spirit of enquiry had gone forth, which required only encouragement and proper direction to be rendered eminently beneficial in its effects. With a view to these signs of the times, the few leading zoologists of whom we could at that time boast, united themselves into this club; hoping by this union to impart a wider influence to their own exertions, to stimulate others to participate in their labours, and, above all, to direct a portion of that energetic spirit of enquiry, which they every where saw around them, into the cultivation of their own favourite science. How far they have succeeded in their object, the history of zoology in this country, during the last six years, will fully evince. Even within their own limited circle, and with their contracted means, they effected much, as I shall have occasion to point out hereafter. But it was in the impulse originally given by their exertions to the propagation of the science, more particularly by laying the foundation of the Zoological Society, that powerful association, which, with unlimited resources, carried their principles and their objects into execution, that their agency is to be traced. Under such an impulse, a few years have achieved the work of centuries. You, gentlemen, have witnessed and triumphed in this result. You have seen zoology emerging from the seclusion of the closet, where, like a thing of mystery, it lay hid under the monopolising patronage of a few; you have seen it gradually passing into light, and winning its way by its own native attractions; until, attaining its legitimate station in public estimation, it has become the popular and universally acknowledged favourite of the day.

The great end of our institution being thus fully accomplished, it remains only for us to lay aside the instrument which has produced this good, and for whose further agency there appears no need. The present time has been considered by the managers of your body as the most favourable for this purpose. They have chosen the moment of triumph for the moment of dissolution; and have determined, in the mode prescribed of old to the parent of the Olympic victors, to "die this day." We can hope, in fact, to merit or attain no further wreath by our own exertions. The activity of those members who first promoted, and subsequently contributed to the support of, this club has been called into a wider and more useful sphere: and to keep up the name and pretensions of a scientific body, with diminished resources, — but, above all, to retain the character of representing the zoology of this country, where a more efficient and legitimate representative of the science, springing from ourselves, has left us little claim to the dignity, — would only serve to institute a striking contrast, of benefit to neither party. We have, in fact, completed our work, and it is time we should retire. The arch is rounded, and the keystone fitted in, and it is expedient that the humble scaffolding should be removed from all incongruous juxtaposition with the noble edifice which it was mainly instrumental in erecting.

Of the general benefits conferred on zoology by this institution since it commenced its career, I shall have occasion to speak before I sit down: but, following the example of my esteemed predecessors in this chair, who have respectively detailed to you the progress of the science during the successive years of their presidency, I shall previously enumerate the various accessions to zoological information which have occurred since the last anniversary.

Much information has been acquired in the class of Mammàlia during the past year. The addition of new species has been considerable, and the elucidation of species already known by name, but insufficiently described, has been of equal extent and importance. Among the former are several contributions to the Fauna of South Africa, by Dr. Andrew Smith, a zealous corresponding member of the Zoological Society. In a paper published in the sixteenth number of the *Zoological Journal*, that gentleman describes five new species of the family of *V*espertiliónidæ respectively belonging to the genera Ptéropus, Rhinólophus, *N*ýcteris, and the *V*espertílio of modern authors. He has also added a new species to the interesting form of Chrysochlòris, of which only one had hitherto been known; two to the *Mangústa* of Olivier; a new species to each of the genera *M*yóxus, *S*ciùrus, *L*èpus, and Bathyérgus, among the *G*lìres; and one to *P*hocæ̀na among the *C*etàcea. In addition to these species belonging to well known groups, he has characterised two new animals, which he looks upon as exhibiting such modifications of form as to demand separate places in our systems. The first of these, which is nearly allied to *S*òrex, he describes under the generic title of Macroscélides [*]; the second, which he conjectures to follow immediately after *M*ús, under that of Déndromus.

To Mr. Douglas, whose social intercourse with us for the last few months has added so much interest to our meetings, and who has just left us, under the most favourable auspices, to retrace his steps over the western part of North America, we are indebted for the description of a new species of *C*érvus, *C.* leucùrus, discovered by him in the Rocky Mountains. He has also given, in the *Zoological Journal*, a more accurate description than we have hitherto possessed of that interesting animal mentioned so frequently by the American writers, the *O*̀vis montàna of the same country. It were much to be wished that the example set by this enterprising naturalist would be more generally followed by scientific travellers, of giving their own descriptions of the animals they discover. In

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[*] M. Isidore Geoffroy St. Hilaire has since described this interesting genus with more detail in a paper in the *Annales des Sciences Naturelles* for October last. Specimens recently obtained from the Cape of Good Hope have enabled that promising naturalist to detect in it the *S*òrex *A*ràneus máximus capénsis of Petiver, the figure of which had previously been regarded by modern writers as a mere caricature, so little did it resemble any animal with which they were acquainted. M. Isidore Geoffroy justly regards the acquisition of this new form among the Insectívora as of considerable importance, inasmuch as it furnishes the first example discovered of the fifth type in this group, and enables the zoologist to complete the exposition of the analogies existing between the Rodéntia, the Marsupiàlia, and the Insectívora. These analogies may be exhibited in a tabular view, as follows: —

Marcheurs.	Rat.	Dasyùrus.	*S*òrex.
Fouisseurs.	Porc-épic.	Phascólomys.	*Tálpa.*
Nageurs.	Castor.	Chironéctes.	*Mýgale.*
Grimpeurs.	Ecureuil.	Petaúrus.	*Tupàia.*
Sauteurs.	Gerboise.	*Kángarus.*	Macroscélides.

the absence of information coming to us with double authenticity as well as interest from the original observer, it generally falls to the lot of some home compiler to appropriate to himself, by the mere imposition of a name, the credit which is solely due to the labours and enterprise of the traveller.

This imputation of neglecting the objects which he observed does not attach to our scientific countryman, Dr. Richardson. His portion of the work entitled *Faùna Boreàli-Americàna*, has been among the most prominent productions of the past year; and will remain a standard volume to be referred to, not only as a source of original information, but as a faithful repository of all that had been previously known respecting the Mammàlia of North America. In addition to the several novelties which he had some time before described in the *Zoological Journal*, and which have been already noticed by my immediate predecessor, he has given us in his late valuable publication the following new animals:—*A'*rctomys Douglàs*ii* and *A.* Beechèy*i*, Geòmys Douglàs*ii*, G. umbrìnus, and Diplóstoma bolbívorum.

Mr. Geo. Tradescant Lay, who accompanied Capt. Beechey in his late expedition in the Blossom, has afforded us an interesting account of the habits and economy of the Ptéropus psélaphon, a new species of the group, which he observed in the Island of Bonin. We trust that the reputation he has attained by this his first essay in zoology will encourage him to pursue a study in which he appears by his name to have an hereditary interest.

We owe to the industry and acumen of Mr. Ogilby, the knowledge of a new species of the very limited group of Paradoxùrus, his Par. leùcopus. We have also some remarks of his on the Linnean genus *E'*quus, which will shortly appear in our *Zoological Journal.* This gentleman is one of the late recruits to our science, and has already given us sufficient earnest that he will not long remain in the subordinate ranks.

Mr. Woods, an active and well known member of the Linnean and Zoological Societies, has increased the catalogue of the interesting group of the Antelopes by the account of a new species, the *Ant.* personàta. A more detailed description than that already published of the animal, together with a plate, have been prepared, and will shortly appear in the forthcoming number of the *Zoological Journal.* From this gentleman, also, who has honoured our London societies by transferring to them the talents which he exerted with great credit to himself in the support of a provincial institution, we may expect much elucidation on the affinities of the Mammàlia. This subject he has deeply studied, and with considerable success.

Dr. Horsfield and myself have, during the same period, added to the number of our feline animals, by an account of a strongly marked species, the *Fèlis* nepâlénsis. A figure of this animal has been engraved for the supplementary plates of the *Zoological Journal.* We have subjoined the details of another animal of the same group in the collection of the Zoological Society, which, however, we conjecture to be one of the numerous alleged varieties of the *Fèlis* rùfa *Guld.*

Next to the interest conferred by the introduction of new species is that afforded by the more accurate description of those which have been previously, but imperfectly, known. In information of this nature the past year has been unusually fertile. At the head of the publications devoted to this subject, I must place the paper of our friend and colleague, Mr. William S. Macleay, on the *Hutìas* of Cuba, the group characterised by M. Desmarest under the name of Cápromys. In this paper four species of the group are accurately characterised from living specimens, and identified with the descriptions of some of the earlier voyagers, more particularly with those of Oviedo, who published his remarks on the natural history of the New World within five and thirty years after its discovery. In this essay our distinguished friend has exhibited additional proof of that extreme tact, which we ever remarked in him while among us, of selecting all that is valuable, and rejecting all that is irrelevant, in the works of his predecessors.

I have already referred to the valuable work of Dr. Richardson, published within this year, on the Mammàlia of North America, in which he has exhibited as much to elucidate the remarks of antecedent naturalists as originality on his own part. Among the animals whose history he has cleared up in that work I should particularise a few, were it not difficult to make a selection where all are of interest. I must notice, however, with especial commendation, his remarks on the Sewellel, whose characters and station in nature he had previously pointed out for the first time, with his usual accuracy, in the *Zoological Journal.*

To our colleague, Mr. Jenyns, we stand indebted for some interesting observations on the common Bat of this country, generally described as the *V*espertílio *m*urìnus of Linnæus. These observations are followed up by some remarks on the *V*espertiliónidæ in general. It is a subject of congratulation to the friends of science, that this gentleman thus actively continues to communicate the results of his acute and diligent researches into the British Fauna. I have here to add that a review of the genera of the same group of *Vespertiliónidæ*, by Mr. John Edward Gray, has appeared in the volume of the *Philosophical Magazine* published within the past year. *

Among the subjects of zoology lately elucidated, the history of our own species has not been neglected. In a late number of the *Zoological Journal* we have some extremely interesting observations, by Dr. Scouler, on the artificial deformities produced on the bodies of the aborigines of the American continent and islands, and more particularly on the skulls of the North American Indians.

But, as far as regards the elucidation of imperfectly known species, the exertions of our learned friend and secretary, Mr. Bennett, during the last year, are above all praise. I shall not be deterred by any false delicacy from stating, even in his presence, the vast debt of gratitude which we owe him. If the establishment of the Zoological Club had produced no other advantage than that of having secured his cooperation in the cause of science, its work would have been done. I need only mention to you his two productions, the *Tower Menagerie*, and *Gardens of the Zoological Society delineated*, of which three parts have appeared within this year, as a proof of my assertion. It is one of the prominent features of the present times, that naturalists aim at a happy union of true science with popular attraction. The extraordinary success of these works has proved the good effect of this judicious union. The principle of "*gratior pulchro veniens in corpore virtus*" * was never more strongly exemplified than in those popular publications. From among the various species touched upon in these works I shall select two, which, although long since named in science, have assumed under his hand an original form. The first is the *Mús* Bárbarus of Linnæus, a species hitherto almost doubtful, but now assuming a certain and legitimate rank among the true *M*ùres; the second the Chinchilla †, an animal familiar to us by reputation, but a personal stranger, until introduced by his accurate delineations. To Mr. Bennett, also, we are indebted for the valuable analysis of works on zoology which have appeared in the *Zoological Journal.* A sense of justice compels me to add, that the credit which may belong to the general superintendence of that work should attach to him. My name, by the kind partiality of my friends, stands at the head of the publication; — the merit is solely his.

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* I am here reluctantly compelled to make one remark upon an observation contained in the above-mentioned paper, where the writer speaks of his having named a certain species when "engaged in arranging the Mammàlia and Reptiles in the Museum of the Zoological Society." Having had the honour of holding the office of Secretary to that Society since its establishment, and having superintended in the course of my official duties the arrangement of the subjects in the Museum, and the published Catalogues, I am enabled to disclaim all assistance on the part of that gentleman, however valuable his services might have been had the Council or Officers found it necessary to have solicited them. In justice to those confidential friends of the Institution who have lent their aid to the scientific arrangement of the different collections, under the authority of the Council, I shall here mention their names, and the departments they have superintended. In arranging and cataloguing the Mammàlia I have had the valuable cooperation of Mr. Bennett and Mr. Yarrell; the Birds have been chiefly attended to by myself; the Reptiles and Amphíbia have been exclusively under the surveillance of Mr. Bell; the Fishes under that of Mr. Bennett and Mr. Yarrell. The Mollúsca have been consigned to the care of Mr. Broderip and Mr. G. B. Sowerby. The Annulòsa have not as yet been set in complete order; the Insects only having been partially arranged by myself, with the occasional advice of Mr. Kirby and Dr. Horsfield. We look, however, to Mr. Broderip and Mr. Stokes for assistance in the Crustàcea among this latter great division, as well as in the succeeding divisions of Radiàta and A'crita. The department of Comparative Anatomy has chiefly devolved upon Mr. Yarrell, who has had much assistance from Mr. Holberton, as well as from our active friend and colleague, Mr. Morgan of Guy's Hospital.

While referring to the additional information on the subject of the Mammàlia, supplied within the last year, I must name another of our colleagues, Mr. Yarrell, whose researches into the comparative anatomy and physiology of animals have already secured for him the highest rank in science. Here, again, the beneficial agency of our Zoological Club is strongly conspicuous. To its influence we are mainly indebted for the public services of Mr. Yarrell. His knowledge and his acumen are his own: but we are proud in the reflection that it was the incitement and example afforded by this club that first induced him to exert these qualities in public. You may judge of the value of this influence by the fruits it has produced. I refer to the reports of our former chairmen for his labours in former years. Within the year of my presidency he has given us a continued series of erudite observations on the osteology and internal structure of the animals which have died in the menagerie of the Zoological Society. If in all of these there should be no new contribution to science, there is ample confirmation and beautiful illustration of the knowledge already possessed. I cannot here pass over without praise the share which another able recruit to zoology has taken in these investigations. From Mr. Holberton, who has for the most part cooperated with Mr. Yarrell in his examination of the beforementioned subjects, much valuable instruction has already been derived, and much more may confidently be expected.

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* "Worth more pleasing in a lovely form."

† The animal is characterised by Mr. Bennett under the name of *Chinchilla* lanígera.

Before I conclude my references to the Mammàlia, I must mention the recent acquisition of two living animals of considerable interest, by the Zoological Society. The first is a specimen of the animal referred to by my predecessor at our last anniversary, as recently described and figured by Dr. Horsfield, under the name of *M*ustèla Hardwíck*ii*. The description was made from a preserved skin which had been one of the numerous results of the indefatigable labours of our friend and colleague, General Hardwicke*, in India. The animal had been previously but imperfectly noticed by Pennant. The acquisition of the present beautiful specimen in its living state fully establishes the species.† The second animal belongs to the rare species described by M. Desmarest as *C*ynocéphalus nìger. We are enabled by the specimen in our possession to restore the species to its proper station; which is in that division of the genus *Macàcus* Lacep., that includes the Magots. It accords with this latter group, and essentially differs from the *C*ynocéphali, by the facial angle and the shape of the nostrils, as observed by our secretary, Mr. Bennett. The tail, the existence of which seems to have been a matter of doubt among the French zoologists, is reduced, as in the *Macàcus* Sylvànus, to a mere tubercle.

In turning to our acquisitions in Ornithology, I hope I shall be excused if I dwell with some particularity on a favourite department. The number of birds added to our Catalogues in the past year has been extensive; although not equal to that added to our collections. It is almost impossible, in fact, to keep pace in our descriptions with the overpowering influx of new subjects. The *Transactions* of our parent society may be in the first place quoted, as presenting some valuable new species to our notice. Mr. Douglas has not confined his observations to the Mammàlia of North-western America, but has added to the list of the birds of that country four species of grouse; viz. the *T*etràones Urophasianéllus, Sabìn*i*, Franklín*ii*, and Richardsòn*ii*; and two species of the genus *O*rtyx, the *O*rt. pícta and Douglàs*ii*; the latter bird having been previously named by myself in honour of the first observer. The two last-mentioned birds are closely allied to a species which had been some time previously made known to science by Mr. Menzies's researches in California, the *Pérdix* californiànus of Dr. Latham, and form an interesting addition to a group which represents in America the Quails of the Old World. It may not be here out of place to mention that specimens of two species of the group, the *Ort*. californiànus and Douglàs*ii*, are at present living in the gardens of the Zoological Society. The same gentleman has added considerably to the information which we had already possessed of the habits and economy of some of the scarcer Gallinaceous Birds of North America; more particularly of the *Té*trao Urophasiànus, which we may well remember to have seen first exhibited and described in this room by our distinguished friend and correspondent, the Prince of Musignano. Mr. Douglas has also published in the *Zoological Journal* some interesting details respecting the economy of the *Vú*ltur californiànus.

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* I am happy to observe that, since the delivery of this Address, a number of General Hardwicke's *Illustrations of Indian Zoology* has been published; a work which will prove the extent of his zeal and ability in the promotion of our science.

† From a comparison of the animal now living in Bruton Street with the description given by Pennant of his white-cheeked marten, they have been ascertained to be identical: and thus another species, rejected by modern writers as doubtful, has been restored to science. Dr. Horsfield's name, *M*ustèla Hardwíck*ii*, sinks consequently into a synonyme of the *M*ustèla flavígula *Boddäert*.

We are all well aware of the rare ornithological treasures contained in the collection of Mr. Leadbeater. We have to congratulate ourselves that many of these are becoming known to science through the exertions of their owner. His liberality hitherto to naturalists, in opening his collections for their use, is well known; his ability in making use of them himself for the advantage of science is now equally conspicuous. In the last number of the *Linnean Transactions* he added some species to the rare genera Phytótoma, Indicàtor, and Cursòrius; a beautiful species to the Tyránnulus of M. Vieillot; and an African species to the group of Pardalòtus, which had previously been supposed to be confined in its range to Australia. The same volume affords a treat to the lovers of the more splendid productions of nature, in the description by the same hand, and accompanying representation, of a magnificent pheasant, the *P*hasiànus Amhérst*iæ*. From the same collection we had an opportunity of seeing at our last meeting some additional novelties, which will shortly be described by their owner, more particularly two interesting species of the *Ps*ittácidæ, belonging to the Australian groups Trichoglóssus and Platycércus.

The commanders of our scientific expeditions, for the last few years, have not neglected the opportunities afforded to them of contributing to our stores of zoology. The valuable ornithological collections which were obtained by Captain Beechey, in his late voyage in the Blossom, more particularly on the north-west coast of America, were sent to me, within the last year, for examination. Twelve species, apparently new to science, were shortly afterwards noticed by me in the *Zoological Journal:* and a detailed description of the whole collection, accompanied with some anatomical and physiological notices by the naturalists of the expedition, together with figures of the new or rarer species, is in preparation. And here I cannot pass over a fact which affords an auspicious omen to the well-wishers of zoology. The work which will include the natural history of this expedition is coming out under the immediate patronage of our government, who have advanced a liberal sum for defraying the expense of the illustrative plates. The same liberality has been evinced in the case of the work lately published by Dr. Richardson, to which I have already drawn your attention. These are tidings which cannot fail to interest us. The expense of suitable engravings for such works is well known to be so great as to deter any author or publisher from venturing on what must prove to him a decided sacrifice; and it is only by its being met by the liberality of government, or of some great institution, that an object so essential to the interests of zoology, as faithful representations of the subjects described, can be attained. The same munificence of spirit may be noticed in the Directors of the East India Company. This patronage alone has enabled the scientific world to profit by such works as Dr. Horsfield has produced on the zoology of Java.

I have here also to announce the arrival, in this country, of a very valuable collection of birds, formed in the neighbourhood of the Straits of Magellan, by our gallant and accomplished friend Captain Phillip Parker King. I have had the pleasure of exhibiting to you, at some of our former meetings, the very interesting collection which he sent to this country, as the results of his first voyage to those Straits, and which was described in the *Zoological Journal*, by extracts from his letters. The present collection, which was obligingly entrusted to me by the Admiralty for description, contains many fine specimens of the rarer species described in those extracts, together with many additional novelties. I wait only for the return of Captain King to bring out an account of this truly valuable collection. This event, we have every reason to hope, will not be far distant; and the intervening delay will be fully compensated by the additional value conferred on his acquisitions by the observations which he will be enabled to supply in person.

From others of the foreign collections which have been forwarded to this country, much important information has been acquired. The noble Sumatran collection, left by Sir Stamford Raffles as a monument of his scientific zeal and acumen, still continues to afford us many striking novelties. Two species of the family of Tetraónidæ, belonging to the singular group of Crýptonyx, in which the nail of the hinder toe is wanting, have been lately exhibited in this room, and subsequently described in the *Zoological Journal* under the names of Crýpt. nìger and ferrugíneus. Some other Gallinaceous species, together with a few Raptorial and Insessorial birds, still remain to be characterised from that collection. This pleasing task is now in progress; and a detailed catalogue of the whole of the collection, which is no less interesting from the materials of which it is composed, than from the circumstances under which it was formed, is in the hands of the officers and other confidential members of the Society where it is deposited. I have also to notice the arrival of some birds from Dr. Heineken of Madeira, which had been previously described by that gentleman in Dr. Brewster's *Edinburgh Journal*. The specimens were accompanied by some additional observations, which will shortly appear in the *Zoological Journal*, and which, with the previous descriptions, will tend to clear up many doubtful points respecting the birds of Madeira. In particular, we have an opportunity of ascertaining, from these specimens, what was the true Fringílla canària of Linnæus. Some living specimens of that species, from which all our numerous domesticated varieties have proceeded, are to be seen, with their true and native characters, in the aviaries of the Zoological Society. To Dr. Bancroft, also, of Jamaica, a valuable corresponding member of the same Society, we are indebted for some subjects of ornithology from the island where he resides, which will shortly be given to the public.

One of the most prominent objects in the institution of our parent Society was the elucidation of the British Fauna. This, of course, has been an equally important object with ourselves; and how far we have contributed to this end, may be inferred from the fact that, in the department of birds alone, above twenty species * have been added to our catalogue since the date of the institution of our club, chiefly by the exertions of its members. The past year has not been barren in such acquisitions. A female specimen of a species of the family of warblers, the Sýlvia Títhys of Linnæus, shot near London, was exhibited at our last meeting. We are indebted to Mr. Gould of the Zoological Society, for the discovery of this addition to our British Fauna. The bird had been sent to him as a common Redstart (Sýlvia *Phœnicùrus*), to which it bears a close affinity; and probably would have passed unnoticed as a specimen of that species, more particularly in consequence of its sex, in which the colours are less strongly marked than in the male, had not the critical knowledge of this rising naturalist detected the distinguishing characters. At the same meeting, Mr. Yarrell exhibited specimens of the trachea of a swan, differing materially from that of the well known *Cýgnus* fèrus, more especially by entering the sternum to a greater distance, and forming, at the end of it, a horizontal instead of a vertical fold. One of these specimens belonged to a bird now preserved in the collection of the Philosophical Society of Cambridge, and which Mr. Yarrell had an opportunity of examining in a recent state. The result of this examination, as well as of that of one or two other similar specimens, confirmed him in the opinion that the bird differed equally in external and internal characters from all the other known species of the group. He expressed his intention of laying before the next meeting of our parent Society a detailed description [*], accompanied by plates, of this new and well distinguished British species. To Mr. Yarrell, also, we are indebted for an accurate description and delineation of the structure of the beak and its muscles, in our Crossbill, the Lóxia curviróstra. I cannot, in this place, omit the expression of our thanks to Mr. Blackwall of Manchester, for several valuable ornithological observations which he has at various times communicated to the *Zoological Journal.* His notes on the natural history of the Cuckoo, on the nidification of birds, and on the habits and economy of several British species, which came under his immediate inspection, are replete with interest and information.

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* It may not be uninteresting to mention the names of the species thus added to our Fauna. They are as follows: — Stríx Tengmálmi Linn., Sýlvia suécica *Lath.*, Sýlvia Tìthys *Scop.*, A'nthus Richárdi Vieill., Accéntor alpìnus *Bechst.*, Emberìza hortulàna *Linn.*, Plectróphanes lappónica *Meyer*, Lóxia Pytiopsíttaca *Bechst.*, Scólopax Sabìni V., Trínga ruféscens *Vieill.*, Trínga Temmínckii Leisler, Gallínula Baillònii Vieill., Cýgnus Bewíckii Yarr., A'nser gambénsis *Briss.*, A`nas rufìna *Pall.*, A`nas casárka *Linn.*, Stérna árctica *Temm.*, Làrus glaúcus *Brunn.*, Làrus ebúrneus *Linn.*, Léstris pomarìnus *Temm.* To these species, entirely new to Britain, may be added two more, which had previously been indicated as British, but not sufficiently authenticated until lately; viz. Charàdrius cantiànus *Lath.*, A`nas glócitans *Pall.*

The advantage which science derives from the publication of works illustrative of the subjects of nature, has at all times been acknowledged with gratitude. At no period have a greater number or a more valuable assemblage appeared than at the present. The splendid work of Mr. Selby on the indigenous birds of this country progresses, and has, indeed, nearly been brought to a close. Two numbers of the Water Birds have been published since our last anniversary. The *Illustrations of Ornithology*, which he has commenced in conjunction with Sir William Jardine, and in cooperation with the leading zoologists of London and Edinburgh, have been increased during the past year by two valuable numbers, containing thirty plates. Mr. Wilson's very important work, the *Illustrations of Zoology*, has also received the addition of two numbers during the same period. In the latter of these is a representation of the *Tétrao* Urophasiànus, to which I have before alluded as having been exhibited and described in this club by the Prince of Musignano, and afterwards commented on by Mr. Douglas. The magnificent undertaking of Mr. Audubon advances in extent and reputation. Twelve numbers of his work have already appeared, containing sixty plates of the birds of the United States, a large proportion of which are new to science. I cannot here omit to mention the appearance of the 2d and 3d numbers of the Prince of Musignano's *American Ornithology*, although the merit of the publication of that work is due to another country. The prince is so identified with this country, by union with its scientific institutions, and friendship with its men of science, that we can scarcely avoid considering the fruits of his labours as belonging to ourselves. The lovers of nature have been gratified, during the last year, by the appearance of a second series of Mr. Swainson's *Zoological Illustrations*. If accuracy of delineation and critical acumen can recommend a work to public favour, the *Illustrations* of that gentleman must secure for him a lasting reputation. During the same period, also, some numbers of Mr. Griffith's translation of the Baron Cuvier's *Règne Animal* have been published, in which several new species have been figured.

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[*] This description has been since read, in which the bird is characterised under the name of *Cýgnus* Bewíckii.

On turning to the next succeeding branches of the Vertebrated Animals, I have to regret that the works which have appeared on the Reptília and Amphíbia during the year of my presidency, although valuable, have been few in number. To Mr. Bell we chiefly look for information on these subjects; but, of late, our friend and colleague has not afforded his wonted answer to our call. His silence, however, is not that of neglect or disinclination. In the deep study of the Chelonian reptiles, to which he has latterly devoted an unremitting attention, he has considered it better (and I cannot but admit that he has judged wisely) to delay the appearance of the results of his labours, until he can invest them with a more perfect form than could be given them in our ephemeral productions. These results, we have reason to hope, will not long be withheld from us; and my knowledge of the progress already made authorises me to add, that the accuracy and elaborate finish with which they are worked out will amply compensate for the present delay. From a few other quarters, some valuable additions to our knowledge of the Reptília have appeared. I shall particularise Mr. Guthrie's *Observations on the Structure of the Heart in* T*estùdo índica*, which he founded on the examination of a specimen in the collection of the Zoological Society; and Mr. Holberton's *Notes taken during the Examination of a Specimen of* T*estùdo tabulàta*, which had lately died in the menagerie of the same society. Both these anatomical treatises are replete with new and interesting information on a subject hitherto little understood. To Dr. Smith, also, whom I have already quoted as elucidating the Fauna of South Africa, we are indebted for the characters of two new forms of Ophidian reptiles, peculiar to that country, which he names Bucéphalus and A'nodon. Of the former group he describes four species, new to science; of the latter, one.

A strong impulse has been latterly given to the study of Ichthyology, both in this country and on the Continent; and the spirit has extended itself even to our colonies. Dr. Bancroft has taken advantage of the opportunities afforded him of examining the fishes of the West India seas, and has sent us some valuable observations on the subject, together with specimens of several of the species. His remarks have been published at large in the 16th and 17th numbers of the *Zoological Journal*, where the lovers of this department of nature will find ample gratification in his copious and accurate details. I have here again to refer to our African correspondent, Dr. Smith, as having contributed to this branch of science, by the description of a new form among the family of Sharks, which he found on the south coast of Africa, and which he characterised under the name of Rhíncodon. Our zealous friend, also, Gen. Hardwicke, has enriched our *Zoological Journal* by some valuable remarks on the Goramy of China (Osphrómenus ólfax *Commerson*), founded on his personal observation of the species, while he was some months resident in the Isle of France. His remarks are at this moment of peculiar interest, as this fish, which had been imported into that island from China, and more recently into some of the French West Indian Islands, and naturalised in both places with such success as to afford the inhabitants a copious supply of wholesome and palatable food, is one of the species which it is in contemplation to introduce into this country, under the auspices of the

Zoological Society. Some numbers of the splendid work on the *Fishes of Ceylon*, by Mr. J. W. Bennett, the commencement of which was announced at our last anniversary, have also appeared within the past year.

At home our ichthyologists have not been idle. Our secretary has favoured us with some notes on the West Indian fishes, to which I have already called your attention, as having been sent to this country, and commented on, by Dr. Bancroft. It is needless to add, that he has contributed much to the determination of the species, and the general interest of the subject. Mr. Bennett is also at this moment busily employed in arranging the ichthyological department of the museum of the Zoological Society; and has already characterised that part of it which includes the Sumatran collection, in a catalogue which will appear in the forthcoming *Memoirs of Sir Stamford Raffles*. Mr. Yarrell, also, whose exertions in ichthyology have been so frequently brought before you by my predecessors in this chair, besides adding to our knowledge within the past year respecting several species of the British fishes, has enriched our Fauna by two species hitherto unknown to it, the *S*òlea pegùsa of Lacepede, and Cóttus *B*ùbalis of Euphrasen.

I now beg to direct your attention in turn to the Invertebrated Animals. But on looking to the list of the late works on this subject, which it has been my duty to prepare to lay before you this day, and feeling how long I have already trespassed upon your time and your patience, I must pass over these subjects more rapidly than I feel to be consistent with the merits of the authors or their works.

The most important communication which has appeared, during last year, on the Mollúsca, is the joint production of our colleagues Mr. Broderip and Mr. Sowerby, on some subjects collected by Captain Belcher, during the late expedition under Captain Beechey to the north-west coast of America. Sixty new species have been described by these gentlemen in the fourth volume of the *Zoological Journal;* and nine species, chiefly from the same collection, have been subsequently added in the succeeding volume. Among these, two striking modifications of form have been characterised: one, belonging to the family of Turbínidæ, under the name of Trichótropis; the second in the group of Tunicàta, under that of Cheliosòma.

From the accurate pen of the former of these gentlemen, our native Fauna has received the addition of two new species of *B*úccinum, the *B*. acuminàtum and fusifórme; the former from the coast of Devonshire, the latter from the south coast of Ireland. Captain Brown, also, of Edinburgh, has enriched our native catalogues with some species of Mollúsca, collected in Scotland; and Dr. Johnston of Berwick has continued, during the same period, his *Contributions* to British zoology, in which are included many new and interesting additions to the same group.

During the year, some observations have been forwarded to the *Zoological Journal*, by our valued correspondent the Rev. Mr. Lansdown Guilding of St. Vincent, on the groups of the Chitónidæ. These form the continuation of that gentleman's remarks on the zoology of the Caribbean Seas, the reading and illustrations of which have afforded so much interest to our meetings in former years. In the same journal, some valuable anatomical papers on the Mollúsca have appeared within the year, particularly *A Description of the Anatomical Structure of Cyclóstoma élegans*, by the Rev. M. G. Berkeley of Cambridge; and *Description of the Animal to which belongs the Shell called, by the Baron de Ferusac, Helicolìmax Lamárck*ii, by the Rev. R. T. Lowe.

In no department of zoology has the reputation of this country been more fully supported than in the Annulòsa. Even when every other branch of our science was languishing under neglect, this department produced some able representatives, and none more able than the author of the *Monogràphia A′pum A′ngliæ.* Happy am I to add, that time has not dimmed the faculties of our revered friend, nor abated his ardour. With the true enthusiasm of science, he has occasionally left the quiet of his closet, during the past year, to animate our meetings, and enlighten our discussions. During that period, he has brought to a close his great work, the *Introduction to Entomology*; and he has likewise found leisure to animadvert on some minor groups of his favourite class, in communications intended for the *Zoological Journal.* Long may he continue to enliven our circles by his presence and example!

Second in point of time, but second to no man in merit or reputation, is our friend the author of the *Hòræ Entomológicæ.* Although distant from us, he has not forgotten our common cause. Besides some observations which he was called upon to bring forward in vindication of some of his previously published opinions—observations which, although bearing upon particular points, are yet replete with those sound philosophical views which pervade every production of his pen — he has favoured us with a paper on the *Ceratìtis citripérda, an insect destructive to oranges.* We may remember the success with which Mr. MacLeay, at a former period, called in the aid of science to the restoration of our native timber, when exposed to the ravages of a destructive insect. In the present notice he has been equally successful in detecting the cause of disease, and suggesting the remedy for it, in a fruit that forms a considerable branch of commerce. It comes not within the province of your chairman, when reverting to the labours of past years, to allude to the promises of the future. But I cannot avoid anticipating a little on this occasion, by stating what, I know, will be heard with the greatest interest by my friends around me, that I have already received, from our colleague at the Havana, the commencement of a series of entomological papers, intended as a sequel to the invaluable *Hòræ Entomològicæ*.

It is one of the great merits of the friend of whom I have just spoken, that he has opened to others the path which he has himself so successfully trodden. Dr. Horsfield, following his footsteps, has not failed to imbibe a portion of his spirit. In his work on the Lepidopterous insects of Java, of which a second part has appeared within this year, our valued colleague has given us the opportunity of remarking a union of characters seldom found in an individual, — and which he shares in common, perhaps, only with the individual just alluded to, — a comprehensiveness of views, accompanied by a minuteness and finished accuracy of detail. We are indebted, likewise, to Dr. Horsfield for a description, in the *Zoological Journal*, of some new species of Oriental Lepidóptera, which did not form part of the collection at the India House, and consequently did not come regularly into his greater work.

Our colleague, Mr. Westwood, whom it is the boast of this club to have enlisted into science, and to rank among its most able recruits, has, during the last year, exhibited to our meetings, and commented upon, several new and interesting Coleopterous insects belonging to the families of *C*icindélidæ, Notóxidæ, and *L*ampýridæ. His observations will appear in the forthcoming number of the *Zoological Journal*. Dr. Heineken of Madeira has, during the same period, favoured us with many interesting observations on various Annulose animals, particularly on the habits of some species of the *A*ráchnida. Mr. Thomson, likewise, has continued his *Zoological Illustrations*, in which he has given descriptions of some of the luminous animals among the Crustàcea; and has, at the same time, added to the information previously communicated by him, respecting the metamorphosis of that group. And Dr. Johnston of Berwick, in his *Contributions to the British Fauna*, has also, with much ability, observed upon some Crustaceous species.

I have already adverted to the important accessions which British zoology has gained within the last few years. In the Annulose animals, the accession has been most striking. Many years have not elapsed since it was recorded, as a subject of triumph, that three thousand species of insects had been ascertained to exist in the British Islands. The past year has produced Mr. Stephens's *Systematic Catalogue of British Insects*, in which ten thousand species are registered. A few of these species are doubtful, having been introduced into our catalogues by the earlier collectors, who were not always scrupulous respecting the authority on which they pronounced an insect to be British. But the number of these is more than counterbalanced by the additions which have been supplied even since the publication of Mr. Stephens's work; and we may now announce, with certainty, that above ten thousand authenticated species of our native insects are to be referred to in that gentleman's cabinet, or in the other chief collections of the metropolis. Our active colleague has been equally assiduous, during the same period, in the publication of his *Illustrations of British Entomology*, the thirtieth number of which has lately appeared. Mr. Curtis's work, also, on British Entomology, has maintained, without intermission, its regular monthly appearance; the last year producing twelve numbers. Six volumes of the work are now almost completed, in which figures of nearly three hundred genera are delineated, and about two thousand species are either indicated or described. I need not refer in this Society, all the members of which are familiar with the merits of the work in question, to the general excellence and scientific value of the plates which accompany it.

It continues to be a subject of regret that the study of the animals belonging to the remaining groups of Radiàta and A′crita has been so partially attended to in the country. The last year has produced little to compensate for the previous neglect. Still we have no reason to despair. The general impulse given to the study of zoology, which has already caused the more prominent and apparently important grounds to be occupied, will ultimately force our naturalists into the remoter and less cultivated fields. The names of some * candidates have indeed already appeared, as claiming possession of these departments. And from the sample, limited as it has been, of their zeal and ability, we have cause to anticipate a successful result.

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* I must here mention the names of Dr. Grant and Dr. Fleming, as having been conspicuous in former years in these departments. Much is expected from them. I wish I could add our friend Mr. Stokes to the number of those who are likely to have leisure to elucidate the present groups. No naturalist could do more ample justice to the subject.

Having now taken a rapid retrospective view of the contributions made to zoology, during the year of my presidency, I beg to refer, in an equally rapid sketch, to the general progress of the science since the first institution of our club. In this progress it is our boast to assert that we have held, directly or indirectly, an adequate share. I shall not here revert in detail to the various publications in which we have cooperated during that period, and which have already been laid before you from this chair, at your preceding anniversaries. But I cannot avoid pointing out, with some degree, I trust, of well founded exultation, the immediate influence we have exerted in the labours of our parent Society. Since the separation, or rather, I should say, the branching off, of that learned body from the Royal Society, a step which the principle of the division of labour in so wide a field as that of science rendered expedient and necessary, the *Linnean Transactions* have continued to be the repository of the natural science of this country. Now, if we look to the zoological papers published in those *Transactions* during the last few years, we shall recognise them as emanating, with one or two exceptions, immediately from ourselves. Nor is the number of such zoological contributions disproportioned to that which it might reasonably be expected to be, in comparison with those supplied from the two other kingdoms of nature. On the contrary, we have reason to rejoice in the comparison. The papers in the last number of the *Linnean Transactions* are exclusively zoological. To the pages also of the *Zoological Journal*, a periodical work, established as subsidiary to the *Transactions*, for the purpose of bringing out such papers as did not bear the high finish or importance adapted to the parent work, and such likewise as required a more speedy publication than the latter could promise, this club has been a zealous contributor. That work, in fact, has been supported exclusively by the members of this body, or by their friends who have written for it under their influence.

It is not, however, to the number of the works contributed to zoology during the last few years, that I appeal as a test of the advance of the science, but to the general spirit in which they have been conceived and executed. The philosophic enquirer, who traces out the progressive march of this delightful branch of knowledge, will at once perceive that the days of compilers have gone by, and the days of original thinkers have risen in their place. He will see, that even in the first necessary steps of our science, in the recording of facts and the registering of species, a strictness and a clearness of expression have taken place among naturalists which almost assumes the merit of originality. No materials are presumed to be genuine, no species allowed to pass current, which have not undergone the ordeal of accurate examination. Striking is the contrast here exhibited with the catalogues of earlier days, where species fabricated from the hearsay of travellers, from mutilated fragments of specimens, or from rude and unauthenticated representations, were handed down with "all their imperfections on their heads" from one generation of compilers to another. Nor is it sufficient, in the present state of science, to look alone to the superficies of the object described. No character is neglected in the examination, internal or external. Comparative anatomy and physiology lend their aid to the true discrimination of species. And it is only by a strict observation of every part of its structure, added to an acquaintance with its economy and geographical distribution, that a modern zoologist considers any species which he undertakes to describe, as entitled to rank among the legitimate accessions to science.

The same scientific accuracy which attends the description of the naturalist extends equally to the representations of the artist: and no stronger proof can be adduced of the advancement of our science, than the contrast exhibited between the illustrative plates of former days and those of the present. It is but justice to our Continental neighbours, to acknowledge that they first led the way to this improvement, and have ably maintained the perfection which they introduced. But those naturalists of our own country who have happily blended the character of the artist with that of the man of science, need not shrink from the comparison of their own labours with the proudest of the foreign productions. I cite, as proofs of my assertion, the plates of Mr. Selby, Sir William Jardine, and Mr. Audubon, in ornithology; of Mr. Swainson, in various departments of animal life; of the Messrs. Curtis, in entomology; and the Messrs. Sowerby, in shells. So faithful, so truly representative of nature, are the products of their pencils, that the student may apply to them for scientific instruction with almost equal reliance as to the subjects from which they are copied. I have mentioned the names of professed naturalists. But, even among the votaries of the art who have not made natural history their exclusive study, we find individuals emulating the strictness of science. It is sufficient to mention the name of the Landseers, to convey to you the idea of all that is faithful as well as striking in the representation of nature. Bewick is recently lost to us, — Bewick, whose original genius opened to the lovers of nature a new field of instruction and delight; — but his spirit, his talent, and his fidelity of expression are preserved to the rising generation in the compositions of his friend and pupil, Mr. William Harvey.

The beneficial results of this accurate mode of supplying us with the groundwork of our science do not terminate in the superior excellence of the description itself. The modern naturalist, finding a firm foundation for his speculations in the authenticity of the materials thus brought within his reach, and encouraged by the number of the subjects with which the increasing spirit of research has supplied him, is enabled to turn from the mechanical details of his art to the contemplation of its sublimer beauties. He has surmounted the first necessary steps of his ascent, — all the petty technicalities of nomenclature, — all the minute particulars that attend the determination of species; — and standing on the high vantage-ground of true philosophy, he can now give way to the investigation of general truths. It is not the mere characters of the isolated individual that he searches out, but the relation which it bears to every other, and the part which it sustains, singly, or in combination with all, in the great scheme of the creation. Under the guidance of such enlarged views, the mind is led forward to conclusions of the highest import, attaining, by degrees, an occasional glance of the system of Nature herself. Whatever may be the process by which her laws are sought out, whatever the artificial mode by which the knowledge of observed facts is communicated, they all unite in aiming at the discovery and elucidation of that true and only system.

The comprehensiveness of the views, which thus forms the distinguishing feature of our present school of zoology, has not passed without reproach; and many sneers, it must be confessed, have been cast, more particularly by some of the minor critics of the French schools, upon our British theorists. These cavillers have forgotten that they have themselves had to boast of a Buffon and a Cuvier; and that the philosophising spirit of enquiry of which I speak, although followed up in this country with a zeal far exceeding their own, to their credit be it spoken, originated with themselves. But we do not shrink from the imputation. We rather appropriate to ourselves the title of theorists with gladness. I know, in fact, no undertaking of excellence, that has not owed its existence to some great and preconceived theory. It was the glimpse of some great truth, that first tempted the enthusiast into the thorny paths of enquiry, that supported his zeal and enlightened his progress through the difficulties of his way, and finally rewarded his hopes and his labours by the radiance which it shed around them. Such theories, it is true, have not always had an equally stable foundation, nor have been pursued with equal success; but they have ever led, even in error, to splendid results. These "lights" may "lead astray," — but they are "lights from Heaven."

In the pursuance of such enlarged speculations, the modern zoologist has met a powerful ally in the sister science of geology. Where his own succession of affinities appears interrupted, and a chasm occurs in the otherwise complete series by which the recent animals that come immediately within his province are united into one body, apparently organised upon one great and comprehensive plan, the geologist brings in the remains of a former world to supply the deficiencies of the present. The accessions accruing from this source to our science, within the last few years, present a theme of exhaustless interest and extent. I could expatiate upon it with delight; and with still greater personal gratification could I dwell upon the ardour, the ability, and the disinterested services by which our friends of the Geological Society have laboured in this great vocation. But my time is nearly exhausted: I could do little justice to the ample subject in the short space that remains; and I must waive the claims of science and friendship, to conclude the immediate business of the day.

Another striking feature in modern zoology is one to which I have already had occasion to allude: the publication of popular treatises on the subject. The extent to which some of the more valuable of these productions have been lately circulated, — I shall instance more particularly the *Menageries* and the volumes on *Insect Architecture*, published under the superintendence of the Society for the Diffusion of Useful Knowledge, — not only proves the popularity of the science, but points out one of the powerful causes that contribute to the cultivation of it. When I mention to you that copies of these publications have been disseminated by tens of thousands, you may calculate not merely how many readers participate in the delights of the study, but how many of them may be induced from the perusal to become observers of nature, if not active cooperators in the science. We may almost, in fact, compare the effects of this copious dissemination of cheap and popular information, to those produced by the invention of the art of printing itself. It was of little avail to the great proportion of mankind that the art existed, if its beneficial effects were to extend only to the opulent and the learned. The fount of knowledge is now open to all:

and that it will not be poisoned by rank or unprofitable infusions, we have an assurance in the cordial superintendence of those individuals who are most interested in preserving its purity. It is one of the most auspicious signs of the times in which we live, that men of science, without neglecting those more recondite and technical performances in which it is necessary to concentrate their knowledge, unite in arraying it in that attractive exterior which recommends it to the good offices of every man.

The impulse imparted to the propagation of our science throughout this country, from these and similar causes, has been already pointed out to you from this chair. You have heard that in almost every town of any note in the united kingdoms, societies have been established, in which the study of zoology forms a prominent object. I may add, that even in these Institutions which have hitherto been most backward in acknowledging the natural sciences as a part of their system of education, a door is now opened to the admission of them. Cambridge has led the way. Her Literary and Philosophical Society has formed the nucleus of a museum, that promises most auspiciously to zoology. In Oxford the same success has attended our cause; and the spirit of Ashmole and Tradescant has revived in those brother naturalists, who, united in taste and liberality as in blood, have claimed for the name of Duncan the gratitude, not merely of their own Alma Mater, but of the world of science at large. While it has been reserved for this age and this metropolis to wipe away the opprobrium so long attached to England, that she possessed no chair of zoology. And to the liberal and highly gifted managers of the London University it is to be attributed, that a professorship in that science has been instituted, and ably filled, during the past year.

Nor has the impulse been limited to the parent country; but seems to have pervaded to the remotest of her settlements. I have to record, among the events of the past year, the establishment of a scientific association among the British residents at Canton, for the purpose of investigating all that is of scientific value in that quarter of the globe. In Demerara, and the neighbouring dependencies of British Guiana, a similar institution has been formed, with similar objects, under the patronage of the present enlightened governor, Sir Benjamin d'Urban. The same spirit is diffusing itself in many of the West India Islands. And in Quebec a society has been lately embodied, the beneficial effects of which have already appeared in the publication of a volume of *Transactions.* Some of the papers in that work, devoted to natural science, will not suffer by a comparison with the best of the productions of the old world.

One more topic of congratulation remains to be noticed. I referred to it when I began to address you; and I return to it with heartfelt interest in my closing words. I allude to the establishment of the Zoological Society. On the eve of the dissolution of this club, it is a theme not merely of consolation but of triumph, that we have been the embryo of that higher body which has now sprung into the perfect form. The individuals who are now about to separate will carry in their recollection, to their latest day, the share which they have had in this great consummation. The occurrences of those evenings will ever be vivid in their memory, when, in conjunction with the illustrious founder and first president of that Society, they suggested the auspiciousness of the times for such an undertaking, and the probability, I should say, the certainty, of success. With what delight have we dwelt upon the words of that great man, when, with an intelligence that in a less enlightened age might have passed for a spirit of prophecy, he portrayed, even to the minutest details, the plans and the hopes which we have since seen realised. Time presses, and already I have engrossed too much of your attention, or I should indulge myself in dwelling upon the qualifications that pointed out Sir Stamford Raffles, as the individual most fitted to organise and preside over such a national undertaking. I should speak of that comprehensiveness of mind which embraced, as if by intuition, the entire of every subject to which it applied itself, — that promptness of spirit, which executed as soon as it conceived, — that total prostration of all selfish feelings, which acknowledged no interests but those of the great cause he espoused. Transcendent as were his other qualities, this last, perhaps, is that to which we may refer with the deepest satisfaction. Beautiful, indeed, it is to contemplate the enthusiasm with which he devoted himself to the cause, — while more cautious calculators were coldly watching the tide of events, prepared to retreat in misfortune, but ready in case of success to "swell the triumph and partake the gale," — that entire devotedness, I repeat, with which, listening not to such timid suggestions, but making "one great offering" of his time, his talents, and his energetic exertions, he laid them, with all-confiding homage, before the shrine of the science he worshipped.

Nor was the confidence misplaced, or the sacrifice abortive. He is gone, — but his spirit and energy survived; and the results appear in the great work before you. On these I need not dwell: you have yourselves witnessed the gradual progress of the undertaking; and its eulogy would proceed with better grace from any other individual than myself, whose pride it is to have been so confidentially associated in the task. I shall merely mention how nobly the exertions of the managers of the institution have been seconded by the feelings of the country. In the short space of three years, sixteen hundred individuals have united themselves to the Society. Within the same period, a magnificent preserved collection in every branch of zoology has been formed by the liberality of its supporters; while upwards of three hundred and fifty species of animals, including examples of almost every larger group in zoology, have been exhibited in a living state in our gardens and museum, for the greater portion of which the Society is indebted to the same liberality. When I add, that, during the same period, some hundreds of thousands of individuals have visited the repositories where these animals have been preserved in all the vigour of life, and in the display, as far as possible, of their native dispositions and economy, you may judge how much has been effected, not merely for the recreation of so many individuals, but for the direction of their minds to the cultivation of the great truths of our science.

I now, gentlemen, take my leave. I commenced my address to you with feelings of regret; I conclude it with sentiments of triumph. The recapitulation, which it has been my duty to lay before you, of the events connected with our science during the last few years, have served to effect this change of feeling; for it has confirmed me in the conviction that we have not lived in vain. Our part has been amply performed; and we may now retire with honour from the scene. We have merged into a higher body, which bears with it our feelings, our principles, and our predilections. Above all, our friendship will, I trust, ever continue equally active — the delight and the pride of our future intercourse, as it has been of our past, — although the body in which it was first cemented is now dissolved.

ART. II. *Further Notice of the late Mr. George Caley.*

By WILLIAM WITHERING, Esq. L.L.D. F.L.S.

Sir,

THOUGH the interesting article in your Obituary (Vol. II. p. 310.), respecting Mr. George Caley, was obviously contributed by a writer well acquainted with the sterling integrity and extraordinary zeal of that almost self-taught naturalist;

some few additional well authenticated facts may not, perhaps, prove unacceptable, especially as they tend to elucidate certain circumstances affecting his earlier career, which have been suffered to remain in obscurity. That this communication was not made immediately consecutive to the original memoir may be regretted; but the delay was occasioned by your correspondent's time and attention having been exclusively engrossed by the completion of the recently published new edition of an elaborate botanical work.

The late Dr. Withering, whose protracted suffering from ill health was so remarkably alleviated by botanical researches *; was never more agreeably engaged than in fostering rising genius; and especially in promoting the views of the tyro diligently seeking after scientific knowledge, to whom he was ever accessible, either by correspondence or personal application.

Among very many who thus benefited by his advice and instructions was Mr. George Caley; who, impelled by an ardour sufficient to overcome obstacles and discouragements from which a mind of ordinary temperament would have recoiled, at length resolved to state the peculiarity of his situation to the author of the *Arrangement of British Plants*, who soon became so warmly interested in the welfare of this genuine child of nature as to continue a correspondence with him during several years, and eventually to assist in advancing his favourite project of exploring the most remote regions of the earth.

Singularly unpropitious as it may appear, Caley was no other than the son of a horse-dealer in the north of England, and early initiated into the stables for regular training to his father's business.

In the eighth year of his age, he had, however, been placed at the free grammar school in Manchester, in what was termed the lower Bible class; and, in the course of about four years, was advanced to the Latin Testament.

The learned languages being, in his father's opinion, little better than useless acquisitions to the embryo jockey, he was, for a short time, withdrawn from such studies; but quickly reentered the same venerable establishment, in the hope of obtaining some knowledge of arithmetic. Brief, however, was the term of his reprieve; for, in his twelfth year, we find him altogether condemned to the drudgery of the stable.

At this critical period occurred one of those singular coincidences which, though apparently fortuitous, often materially affect the future destiny. But the then irksome predicament, and the determined spirit with which Caley pursued his favourite object, will be best described in his own artless narrative, as addressed to his newly acquired friend: —

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* Vide Memoirs and Tracts of William Withering, M.D. F.R.S., 2 vols. 8vo. Longman.

"Dealers in horses," observes Caley, "have an opportunity of seeing the natural and accidental deformities that these animals are subject to; and their horses, through high keep and little exercise, are liable to many diseases, for which there is often call for the farrier. As every blacksmith pretended to be a farrier, I, having a good opportunity of hearing them discourse, saw that they did not understand the structure of a horse, and might as well style themselves physicians and surgeons. There happened to be in the house an odd volume of Gibson's *Farriery*, in which were some anatomical figures, and receipts for the curing of diseases. This old book stimulated me to search into the errors of farriers, or, at least, had liked to have done so. In his prescriptions were a number of herbs: I began to search after them; but had no sooner done that than I wanted to know more about plants. In the course of time, I got some petty herbals; but these not satisfying my mind, only tended to perplex me, or rather excited me the more. At length I got Johnson's *Gerard*, thinking, then, I should go on boldly; but, alas! I was overwhelmed again. Then I heard of your *Botanical Arrangement*. It was not long before I got a copy of the second edition: I was now at a greater loss than ever, for I really could not tell what to make of them. However, I concluded that it would be nonsense to let the books lie idle. Winter was then approaching, and no plants to be seen: I resolved to learn the *Introduction*, and soon gained a tolerable idea of it. I then wished for to see some flowers; but still a dreary winter was before me. I was obliged to put up with the inconvenience, so that *I learned the* Introduction *over and over* before the spring. When the plants began to flower, I began to try my strength in the science; but knowing a good many plants before, I used to cover the names, in order that I might not favour one character more than another. Sometimes I was right, sometimes wrong; but, by this method, I gained a good knowledge of investigation. By this, and the practice during winter, I have thought oftentimes to equal those who have been under the tuition of botanical lecturers. Now I began to find out botanical companions (for, before, I had laboured by myself); but they, following some manufacturing branch, my employment would not permit me to spend the time that they did. Hereupon I determined *I would learn to weave*. I had no sooner gained a fair idea of that business than there was a stagnation in trade: then I returned to the stable again. There being many foreign plants to be found in gardens, which I knew nothing of, caused me to purchase the *Génera Plantàrum* and *Systèma Vegetabílium.* Then I was at a loss about the Latin terms, for I had forgot most of what I had learned at school; but they being technical, and chiefly nouns, I soon recovered that loss. Now, the idea of visiting foreign parts began to enter my mind: I thought of going to sea; but not having had a nautical education, and could not confine my mind to it, I considered it would be rashness. It was not long before it entered my head to write to Sir Joseph Banks. At length he sent me an answer: the result was, that he knew of no other method than to be employed in a good botanic garden; and, if I made a proper progress, he would give me farther assistance. I did not much like the thoughts of working in a garden, for that would be out of my element; and being tied to regular hours was not like working piece-work, knowing what I had to do, and then giving over. However, I stood it as well as might be expected, till I went to Kew; which place, I do sincerely acknowledge, I could not weather: not through the hardship of work, but from being debarred of cultivating my mind according to its natural inclination. Having a little idea of manufacturing goods is of great utility to me, for it will cause me to pay attention to plants that are worthy of being applied to such purposes. Those persons who have been sent into foreign parts to collect plants, have not favoured agriculture, commerce, and the materia medica, so much as an inquisitive mind would expect; for they are chiefly such as have worked in some botanic garden.

"If I was to mention all the difficulties and fatigues that I laboured under in pursuing my natural inclination, I should never expect to be credited; but I will drop this subject, for I am afraid I shall weary your patience. As to learning to draw, I assure you that I have not a good opportunity at the present; but, on shipboard, I intend to try at it. With regard to Latin, I may very easily improve in that; for, at the present, I understand the declensions of nouns as well as I did when I went to school; and pretty well of the conjugation of verbs; and also of the agreements of concords, particularly that between the substantive and adjective; or, to speak in short, in what the *Génera Plantàrum* chiefly requires. I think it is not very difficult to learn to read the French, but difficult to pronounce. Whatever elementary books you would favour me with, I could wish to be directed to Strangeways, near Manchester. I am, with the highest regard and esteem, your truly obedient and humble servant,

"*June* 15. 1798. GEORGE CALEY."

With hearty goodwill did the present writer surrender his elementary works, both in the Latin and French languages, for the benefit of the youthful adventurer, and they were quickly forwarded according to his instructions.

But, alas! the ardent imagination of our aspirant had well-nigh outstripped all reasonable expectation; and a series of remonstrances with the President of the Royal Society, somewhat injudiciously, not to say intemperately, urged, for a season blasted his high-flown hopes. He, whose delight was

> "To wander as free as the wind on the mountains,"

could ill brook, even for a limited period, the confinement of stated hours, or the restraint of garden walls. After having vainly endeavoured to convince Sir Joseph that he needed no such initiatory course, and that he was already qualified for the projected expedition, he withdrew in disgust, again to ruminate on his wayward fate amid the wilds of Lancashire.

Now, that talent of every kind is likely to be forced and fostered, perhaps, as some may apprehend, to an extreme degree, let those whose warm temperaments glow with the laudable desire to excel, beware of yielding to that seductive self-sufficiency which is but too apt to resist the wiser counsels of experience, and thus, in innumerable instances, to make wreck of the brightest expectations.

And such disappointment would, probably, have prematurely terminated the career of Caley's usefulness, but that he was so fortunate as to have engaged the attention of a patron not less habituated to detect merit, even through a rough exterior, than to exercise thereon a characteristic generosity and benevolence.

After an alienation, happily of no long continuance, Caley once more thought proper to address Sir Joseph, in terms which drew forth the reply here inserted, and which, I am confident, will be considered as a notable instance of amiable condescension, of honest and well timed rebuke: —

"*Soho Square, July* 16. 1798.

"MR. CALEY, — Whoever told you that I said I was angry with you has been mistaken. I am sure I never said so, because I never felt myself angry with you.

"I told you, when I first wrote to you, that unless you would gain your livelihood as a gardener, while you made yourself acquainted with the plants cultivated in the gardens here, I did not mean to get employment for you as a botanical traveller. By so doing, I put you in the same situation as Aiton, Lee, Dickson, and Mason were in, when they were of your age; all of whom, at that period, gained their livelihood in the gardens without complaining.

"No person has been appointed to go to Botany Bay in your stead. The man who is going, by my recommendation, is the son of a market-gardener, and knows nothing of botany: he has no appointment or salary; and means to settle there, with a wife, as a farmer and market-gardener.

"How you can be useful to your employers as a botanical traveller, to send home seeds and plants from thence, till you have made yourself acquainted with those already in England, I do not know. We have now several hundreds of such: and to send them again would be idle and useless. You might discover some drug valuable in dyeing or medicine, for your own advantage; but, unless you are able to benefit your employers as well as yourself, how can you expect employment?

"You are certainly, however, eminently capable of searching the woods with diligence and advantage for dyeing drugs, and other matters likely to be advantageous to manufacturers and trade: and that many such things remain unknown in the unexplored wilds of a country larger than all Europe, is a matter of infinite probability. If the gentlemen of Manchester will make a subscription to maintain you in that employment, on such terms as shall be agreed upon between you and them, I will readily become a subscriber, and use my best influence with Government to send you out at the public expense, in which I have no doubt of being successful. I am, Sir, your very humble servant, — Jos. Banks."

The humble individual on whom the Right Hon. Baronet had thus bestowed the best advice soon found his situation, even among his *quondam* associates, little less mortifying than when the fancied prisoner of a royal garden. The plan of sending him out by subscription met with no success: and even the indomitable spirit of Caley was compelled, in a degree, to succumb to the more ordinary course of events.

Not less dark and drear than the season in which the good tidings arrived was the state of Caley's mind, when, in the midst of doubts and perplexities, towards the end of November, 1798, his true friend, Sir Joseph, hastily summoned him to London, in expectation of immediately despatching him to the *terra incognita* he had so ardently longed to explore. During this expedition, it was agreed that he should have a sufficient maintenance; that his primary duties were to be the collecting of specimens of plants for his worthy patron, and seeds for the garden at Kew, with the use of duplicates for his own advantage.

Caley was quickly on his passage over the trackless ocean;

and rarely has the tedium of a protracted voyage been more effectually or advantageously dispelled than by the varied studies which he, during the whole progress, unweariedly pursued.

We have seen the lone wanderer irresistibly impelled, by the contemplation of Nature in her grandest yet most savage form, to penetrate the parched deserts of Africa; and, in search of all-captivating novelty, discarding the primary instinct of the mind, to approach even the ruthless tiger's lair, as though unconscious of danger: but our Caley was destined to less hazardous shores; it was his fate to be wafted to more temperate climes; and, while exploring the flowery prairies surrounding Botany Bay, instead of encountering the Mauritanian lion, he felt no fear but that of scaring away the timid kangaroo.

Thus did this extraordinary man attain the summit of his ambition: yet what could have been more adverse than such a birth, than such a parentage, and, we might almost add, than such an education! But true genius, if accompanied with discretion, surmounts all impediments.

How satisfactorily Mr. Caley justified the confidence placed in him is well known. Indeed, it appears by his letters from Paramatta, Sydney, and other stations in the colony of New South Wales, that, as the illimitable field of Nature expanded before his enraptured gaze, proportionally did his powers of observation become enlarged. No branch of natural history seems to have been neglected: and the extensive collection of quadrupeds, birds, and reptiles, in 1818 purchased by the Linnean Society, and still constituting the most splendid portion of that museum, will remain a lasting monument of his successful efforts.

But having already, in some degree, fulfilled the intention proposed, and being reluctant further to trespass on your valuable pages, I conclude by subscribing myself,

Sir, yours, very respectfully,

William Withering.

Wick House, Feb. 10. 1830.

Art. III. *On the Habits of the Chameleon.* By Henry Slight, Esq. M.R.C.S., Honorary Librarian to the Portsmouth Philosophical Institution.

Sir,

In your last Number (p. 188.), your ingenious correspondent J. H. Davies gives a short description of the chameleon. Now, the animal thus spoken of was sent with a smaller one from Malaga, as a present to me, by Colonel Craig: they arrived by the Duke of York steam-packet, on the return of the staff of the troops from Portugal, and were kept in my drawingroom for months. The larger one was of a lightish sap-green colour; the smaller one, much darker. They were kept on a wicker basket in the bow-window, not confined; and slept many hours in the day, lying on a projecting ridge of the wickerwork. During the sunshine, the animals rendered themselves flat, with a view to expose themselves as much as possible to the influence of the warmth; and they were at these times often of a greenish stone colour, and pale. If, however, disturbed, they contracted the abdomen, expanding the ribs, and often became instantaneously of a dark green or even indigo green colour. *Sometimes only one side changed colour.* The larger one was apparently vigorous, and in health: when awake, its eye (of a dark colour, and very lustrous) was constantly directed in every possible direction, the motions being by a kind of jerk, and very rapid, as if in search of food; of which, however, it partook sparingly. I was accustomed to put the common cockroach, in number about six or seven, in a shallow tin vessel, and to place the chameleon on the edge, its head projecting over the brim, to which its forceps were generally so firmly attached that it was often difficult to remove them. After making a circuit round some portion of the circle, the animal would distend the pouch beneath the jaws, expanding them two or three times in a trifling degree; and, stretching forward its body on the fore legs, it would suddenly dart out its tongue with such force as to make a very sensible ring or noise on the opposite side of the tin; would catch the beetle or roach on the trumpet-shaped extremity of the tongue, which was retracted as quick as lightning, and mastication and deglutition followed. In this manner it would take three or four of the insects from the vessel; but I could never induce it to take them from my hand, nor would it eat them when the mouth was opened, and the roach introduced with the fingers: a mode I was obliged to have recourse to with a view to feed the smaller one, which appeared languid, and died about two months after its arrival. It would, however, swallow the large flesh fly, if introduced into its mouth, although there was some difficulty in opening the jaws contrary to the will of the animal. They slept generally on the top of the basket, the heads projecting over the edge, and the tails curled round one of the small divisions of wickerwork; and it was curious to observe the firm attachment they had by this means. On going into the room with a candle, the creatures always appeared of a pale ashy stone colour, or a spectral blue, precisely similar in hue to the colour produced on the hand when held before a blue glass, as seen in the windows of chemists. Their motions were exceedingly slow, and they always firmly attached one leg to whatever substance they could reach, before they let go with the other. The creatures did not feed more than once in three or four days; and they would never catch any of the beetles with a hard covering, many species of which I collected in my walks, and exposed to them in the tin vessel. Several times I lost them, and was afraid to step about the room, lest, from their variety of colour, I should tread on them; but I generally found them in the folds of the curtains, always on the blue lining, and not on the chintz pattern. During the long time I kept them, they had alvine secretions, of a pale yellow colour, and in rounded conjoined lumps, not more than four times. I have often seen one side of the creatures, more especially the larger one, nearly stone colour, and the other a black green; and the changes of hue were always very rapid, and accompanied with either elevation or depression of the ribs. The skin of the creatures I should resemble to an infinite number of facets of a certain determinate figure; and I think the changes of colour depended on the power of the animals to elevate, alter, and depress the faces or angles of these facets (I am not much of a philosopher, and I scarcely know if I have rendered myself intelligible in this last sentence), and the consequent difference of angle at which the light was received.

At the request of Lieut. Davies I gave them to him, with a view to his continuing observations on their habits and economy; and, therefore, it is probable that that gentleman, in whose possession they were for several weeks, will favour you with his remarks.

Soon after Lieut. Davies's departure for Ireland, the animals died from the effect of cold, and are now in the museum of the Institution here. I am, Sir, &c.

110. *High Street, Portsmouth,* HENRY SLIGHT,
March 18. 1830.

ART. IV. *Trait in the Habits of the Weasel, with Notes on the Water Shrew and the Thrush.* By W. L., Selkirkshire.

Sir,

THE following story is told in Selkirkshire: — "A group of haymakers, while busy at their work on Chapelhope meadow, at the upper end of St. Mary's Loch (or rather of the Loch of the Lowes, which is separated from it by a narrow neck of land), saw an eagle rising above the steep mountains that enclose the narrow valley. The eagle himself was, indeed, no unusual sight; but there is something so imposing and majestic in the flight of this noble bird, while he soars upwards in spiral circles, that it fascinates the attention of most people.* But the spectators were soon aware of something peculiar in the flight of the bird they were observing. He used his wings violently; and the strokes were often repeated, as if he had been alarmed and hurried by unusual agitation; and they noticed, at the same time, that he wheeled in circles that seemed constantly decreasing, while his ascent was proportionally rapid. The now idle haymakers drew together in close consultation on the singular case, and continued to keep their eyes on the seemingly distressed eagle, until he was nearly out of sight, rising still higher and higher into the air. In a short while, however, they were all convinced that he was again seeking the earth, evidently not as he ascended, in spiral curves; it was like something falling, and with great rapidity. But, as he approached the ground, they clearly saw he was tumbling in his fall like a shot bird; the convulsive fluttering of his powerful wings stopping the descent but very little, until he fell at a small distance from the men and boys of the party, who had naturally run forward, highly excited by the strange occurrence. A large black-tailed weasel or stoat ran from the body as they came near, turned with the usual *nonchalance* and impudence of the tribe, stood up upon its hind legs, crossed its fore paws over its nose, and surveyed its enemies a moment or two (as they often do when no dog is near), and bounded into a saugh bush. The king of the air was dead; and, what was more surprising, he was covered with his own blood; and, upon further examination, they found his throat cut, and the stoat has been suspected as the regicide unto this day."

This singular story I always looked upon as too good to be true, until lately a friend mentioned the following fact that came under his own observation:—A light snow covered the ground; and he, having walked out to an adjoining hill to meet with one of his shepherds, fell in with the track of one of these weasels, which is easily to be distinguished from that of the smaller species, by the larger footprint and length of the spring, among the snow. He followed the track for some time, for his amusement, along the side of the hill, until he came to the marks where a pair of grouse had been sitting, when he lost all traces of the weasel, and could follow it no farther. As there was no appearance of a hole, he was much surprised; and paying close attention to the track of the animal, he came to be convinced that it had sprung upon one of the birds, which had flown away with it. As he is a person of uncommonly acute observation, sound judgment, and strong sense, I have the utmost confidence in the correctness of his judgment regarding this curious circumstance. The conclusion is, that the stoat knew quite well what it was about, and would keep its hold until it came to the ground again, under similar circumstances with the eagle. The matchless agility and comparative strength of this bold little creature would enable it to save itself during the fall; before which took place, it had probably, as in the former strange instance, destroyed the life of its more harmless prey.

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* In general, the motion of his wings is hardly perceptible: an impetus is given, but the stroke is far between, and he seems impelled by some invisible power.

The Water Shrew. — In Vol. II. p. 219., Mr. Dovaston gives a very delightful and fascinating account of his discovering somewhat of the manners and habits of the water-shrew (Sòrex fòdiens), and seems to think that this elegant little animal had become nearly extinct in the island: rare it assuredly is. My eyes have been searching after such sorts of objects, in a cursory way, for these thirty years and more, and I only have seen two of them. The first time was about six years ago: I noticed it swimming across a clear rill that descends from high ground near Abbotsford. A gentleman present knew the creature by the English name: and after much tender care about its capture, and examining it as minutely as its impatience and our fear of hurting it would permit, we set it at liberty. It was, as nearly as I could judge, one third larger than the common shrew, of the colour of the mole, or fully as near black, if my recollection is correct. In fact, I thought, when I first saw it, that it was some rare and undescribed species of mole. The belly was singularly flat, and only removed from a pure white by a touch of silver grey. The small stream where it was swimming runs through a deep chasm covered with old oaks and brushwood, and runs generally on a rocky bottom. The other I saw early last spring: it was dead; newly killed by a cat, as I thought (which kills, but does not eat, the common shrew). The head of this was destroyed. I found it in a pond surrounded by a young wood, at Whitehope on Barrow. I could only compare the two from recollection; but I think the last, whose habitat was very dissimilar, was considerably less: the colour had more of a shade of brown. Some time afterwards my daughters found another, likewise dead. I was then from home; and so had, at neither time, the luck to procure a specimen: the more to be regretted, as I can hardly conceive any person having the firmness to kill one of these rare and beautiful little creatures on purpose.

Habits of the Thrush (T*úrdus músicus*). — In the course of last August, travelling on the coach to Edinburgh, I met, as a fellow-passenger, a very sensible man, whom I discovered to be a master millwright from Fife. After much desultory conversation, we came to remark the great increase of thrushes and blackbirds all over the country, and their cruel depredations on gardens. Having noticed the singular tameness of the thrush, particularly in the odd places it sometimes chooses for constructing its nest, my companion asked if I had ever observed any of them make their nest within a house; and added that he once saw such an instance, and came to be greatly interested by it. He had been making a threshing-machine for a farmer in the neighbourhood of Pitlessie, in Fife, and had three of his men along with him. They wrought in a cart-shed, which they had used for some time as their workshop; and one morning they observed a *mavis* enter the wide door of the shed, over their heads, and fly out again after a short while; and this she did two or three times, until their curiosity was excited to watch the motions of the birds more narrowly; for they began to suspect that the male and female were both implicated in this *ish and entry*. Upon the joists of the shed were placed, along with some timber for agricultural purposes and old implements, two small harrows used for grass seeds, laid one above the other; and they were soon aware that their new companions were employed, with all the diligence of their kind, in making their nest in this singular situation. They had built it, he said, between one of the bulls of the harrow and the adjoining tooth; and by that time, about seven o'clock, and an hour after he and his lads had commenced their work, the birds had made such progress, that they must have begun by the *screich of day*. Of course, he did not fail to remark the future proceedings of his new friends. Their activity was incessant; and he noticed that they began to carry mortar (he said), which he and his companions well knew was for plastering the inside. Late in the same afternoon, and at six o'clock next morning, when the lads and he entered the shed, the first thing they did was to look at the mavis's nest, which they were surprised to find occupied by one of the birds, while the other plied its unwearied toil. At last the sitting bird, or hen as they now called her, left the nest likewise; and he ordered one of the 'prentices to *climb the baulks*, who called out that she had laid an egg; and this she had been compelled to do some time before the nest was finished;

only plastering the bottom, which could not have been done so well afterwards. When all was finished, the cock took his share in the hatching; but he did not sit so long as the hen, and he often fed her while she was upon the nest. In thirteen days the young birds were out of the shells, which the old ones always carried off. At first they could not be quite certain what food was brought for the young; but this, in time, became an object of peculiar interest, and he and his companions noticed that the birds brought "a grit hantle o' stripit buckies" * (Hèlix nemoràlis, horténsis, and arbustòrum); that she did not try to pick the snails from the buckies, but lifted each above her head, gave it a sharp lick on a tooth of the harrow, and broke it all to pieces, and then caught the snail: she never let one fall. † She never brought any common snails (without shells), and not many worms. Sometimes she brought butterflies; and she brought a *hantle o' muffies* (large moths). She generally carried away the dung of the young birds. As the young grew, and demanded greater supplies, the entrance and retreat of the parents through the door of the shed was often so rapid that it could not be seen, but was only known from the *swooff*, or sound, as they darted over the heads of the men.

One Monday morning, when the millwrights came to work at the usual hour, and expected the daily pleasure of seeing the mavises alert and busy, the nest was gone. A boy, prowling about on the Sunday, had found the little "family of love." "The parents," my friend said, "mourned about for twa days: maistly the hen." He himself, he said, could not well settle to his work for an hour or twa, and was "neither to ha'd nor to bind, he was sae mad at the illdeedy laddie."

I am, Sir, &c.

Selkirkshire, Dec. 1829. W. L.

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* I could, with some trouble, have given this curious relation still more interest by using the graphic and *naïve* terms and language of the eye-witness; but being in the broadest *patois* of the "kingdom of Fife" (which, by the by, he did not much use in ordinary discourse, or talking of the details of his business), it would not have been generally understood by your readers.

† In the *Edinburgh Journal of Natural and Geographical Science*, No. i. p. 66., it is mentioned that Mr. M'Gillavray had, in one of the Western Islands, observed a thrush (Túrdus mùsicus) breaking whelks (Túrbo littòreus) on the shore. Being once on the western shore of Harris, in the month of June, I was greatly surprised to hear the song of the thrush resounding on all sides from the heathy and rocky banks of the sea; but I have always suspected it to be another species, darker and less.

Art. V. *Notice of a Discovery respecting the Food of the Bearded Titmouse* (*Pàrus biármicus* Lin.). By W. H. Dikes, Esq.

Sir,

Considering it to be incumbent on the cultivators of natural history to make public any observation which may tend to the correction of prevailing errors, I take the liberty of communicating, through the medium of your useful publication a discovery, of a trivial nature indeed, but one which appears to have escaped the notice of ornithological writers. I allude to the food of the Bearded Titmouse (Pàrus biármicus *Lin.*). This is stated, in all the descriptions which I have consulted, to be the seeds of aquatic plants. Having, however, lately had an opportunity of examining three specimens, I find that this account is erroneous; the crop did not contain a single seed, but, on the contrary, was completely filled with the Succínea amphíbia in a perfect state, the shell being unbroken. These shells were singularly closely packed together, the crop of one, which was not larger than a hazel nut, containing twenty, and some of them of a good size; it contained also four of the Pùpa muscòrum. Of all these Mollúsca the shell was quite uninjured; which, when the fragile nature of that of the Succínea is considered, is somewhat extraordinary. The shell appears to be passed into the stomach in the same perfect state, as I discovered one which I presume had been recently swallowed, quite entire. They are not, however, voided in this state, for I found the stomach to be full of small fragments of shell, in a greater or less degree of decomposition. This work of destruction is accomplished by the action of the stomach, aided by the trituration of numerous sharp angular fragments of quartz, which had been instinctively swallowed, and by which the minute division of the shells is most completely effected. Wishing you much success in your useful undertaking, I remain, Sir, &c.

Hull, Jan. 7. 1830. W. H. Dikes.

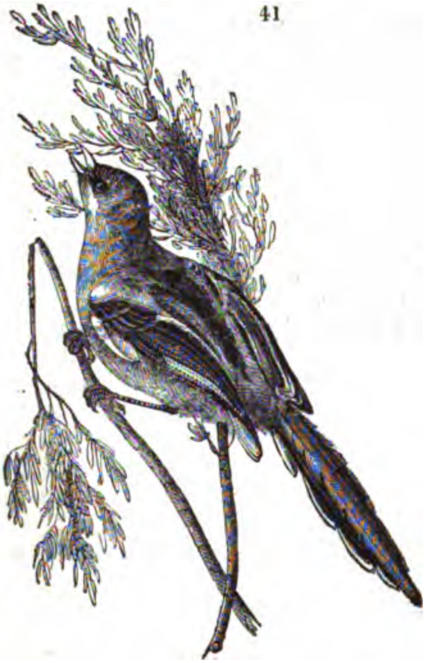
Art. VI. *Notice of the Plumage of the Bearded Titmouse when a young Bird.* By the Rev. J. Lakes.

Sir,

The interesting remarks on the Bearded Titmouse (Pàrus biármicus) in Vol. II. p. 222. induce me to mention, that, during a visit about three or four years since at Yarmouth in Norfolk, I had an opportunity of seeing the male, female, nest, and young bird in its first year's plumage, of the Bearded Titmouse, which had been found and preserved by an excellent bird-stuffer in that town. Thinking the three birds very beautiful, I made an accurate coloured drawing of them of the size of life. The pretty sketch and pleasing account of this species, already alluded to, induced me to turn to my own drawing, and observing the remarkable difference in the plumage of the young and old bird, I thought it might be acceptable to your Magazine, and have therefore copied, as accurately as possible, the original. Never having seen this species in their live state, I am unable to give the character, but as far as regards colour, my drawing will, I believe, be found perfectly correct. I am, Sir, &c.

J. Lakes.

Liskeard Vicarage, Cornwall, Aug. 15. 1829.



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Description, taken from the drawing sent. (*fig.* 41.) — In the young bird of the year the bill is orange yellow; the irides bright yellow; from the beak to the eye a black streak, but no pendent tuft of loose black feathers, forming a beard, as in the adult male; head, neck, breast, and under parts yellowish brown; chin somewhat lighter; back black; scapulars varied with brown, black, and white; wing, primaries black edged with white, secondaries dark brown; wing coverts barred brown and black; carpus and bastard wing white; centre tail-feathers and their coverts orange brown; outer tail-feathers graduated, black, edged with white; legs and toes black. The nest of the Bearded Titmouse (Pàrus biármicus) is thus described in the *Zoological Journal*, vol. iii. p. 85, 86.:—"It was placed near the ground, being sustained only an inch or two above the surface by the strength of the stems of the coarse grass upon which it was fixed: it was composed entirely of dried bents, the finer ones forming the lining, and others increasing in substance made up the interior. The eggs were four in number, rather smaller than those of the Great Titmouse (Pàrus màjor) and less pointed, white, and sparingly marked with pale red irregular lines or scratches."

Nov. 26. 1829. S. T. P.

Art. VII. *Notice of Stones found in the Stomachs of Pike.* By the Rev. W. T. Bree, M.A.

Sir,

I have now in my possession, and herewith forward to you, a stone (*fig.* 42.) weighing 4¾ oz., taken out of the stomach of a pike, which was caught by a friend of mine, while trolling in the Earl of Craven's water at Coomb Abbey. The fish weighed about 3½ lbs., and being in good condition, did not appear to be incommoded by this internal incumbrance. The stone, I should observe, is not a concretion formed by accident or disease, such as is sometimes found in the stomachs of cows, &c., but an ordinary pebble, of a somewhat flat rounded shape, and bearing the appearance of having been broken at some remote period on two of its sides. Since its fracture, however, the pebble has been well bouldered, so that it now presents no sharp projecting edges, nor any very considerable irregularity of surface.

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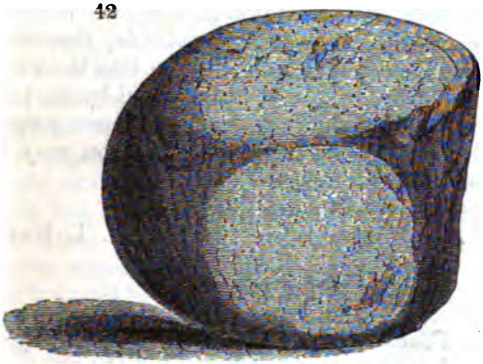

I recollect having formerly seen, at Packington Hall, the seat of the Earl of Aylesford, another pebble considerably larger (if my memory serves me) than the present one, which had also been found in the stomach of a pike caught near that residence. I have conversed on this subject with an intelligent friend and a great fisherman, who assures me that several instances of the same kind have come under his own knowledge: one stone in particular, which he took himself out of the stomach of a pike, he kept as a curiosity for several years, and he describes it as having been full half as large as his fist or more. The fact, in short, of the existence of pebbles in such situations is unquestionable, and from the above instances appears not to be of very unusual occurrence. There can be as little doubt that these pebbles have entered the stomach of the fish through the mouth. But the question is, how comes the pike to swallow such indigestible matter? It has been suggested to me in answer, that the fish, in seizing its prey, might along with it have accidentally picked up the stone from the bottom, and swallowed both together. But is not the pike too good a marksman to take up so large a substance *accidentally* with his food? and may not some more probable way of accounting for the fact be devised? The voracity of the pike — the river shark, or tiger of the fresh-water, as he may be called — is almost proverbial. It is well known that this fish, when in the humour for taking its prey, will strike almost without discrimination at whatever object it sees moving in the water. It is not improbable, therefore, that the stones in question having been thrown into the water by some person passing by, may have been seized by the pike while in the act of sinking to the bottom, and at once gorged for more digestible food. Perhaps, however, you may be able to suggest some better solution of the problem.

I am, Sir, &c.

Allesley Rectory, Jan. 5. 1830. W. T. Bree.

Art. VIII. *On the Póntia Chariclèa and Mètra, the large and small Cabbage Butterflies.* By the Rev. W. T. Bree.

Sir,

It has long since been remarked by collectors of insects, that most of the first specimens of Ponti*a* brássicæ (Vol. II. p. 226. fig. 55.) and ràpæ (Vol. II. p. 227. fig. 57.) (large and small cabbage or garden white butterflies), that make their appearance in the early spring, are much smaller in size, and have the black marks on their wings much fainter than in the specimens produced later in the season. In the case of P. ràpæ, more especially, the wings on the upper side sometimes present a perfectly immaculate surface. This variety of P. ràpæ has, we are told, long been known among collectors by the appellation of "Mr. Howard's White," and in Mr. Haworth's superb collection of Lepidóptera is ticketed "P. ràpæ var. præ̀cox." That eminent entomologist, Mr. Stephens, was, however, I believe, the first to raise these varieties to the rank of species under the respective names of P. Chariclè*a* and P. Mètr*a*; and the principal points of difference by which they are to be distinguished from their too nearly allied congeners may be found detailed at large in his interesting *Illustrations of Entomology*, now in the course of publication. It yet remains to be seen, however, whether, in the judgment of entomologists in general, these Early Whites (as they are termed) will eventually maintain their place as genuine and distinct species; and it is under the hope that some accurate observer may be induced to institute experiments with a view to set the question at rest, that I call your attention to the subject. For myself, I may say that I have not been unobservant of these insects for some years past, but have more particularly attended to them during the spring and summer of the present year; and, as far as my observations go, they lead me to the conclusion that P. Chariclè*a* and Mètr*a* are mere varieties respectively of P. brássicæ and ràpæ. P. ràpæ is avowedly a very variable insect, and being too, as well as P. brássicæ, a most abundant species, there is consequently the more scope — there are so many more chances — for variation to take place in the individuals. It must be admitted, indeed, that when a small and perfectly immaculate specimen of P. Mètr*a* is compared with a full-sized and strongly marked one of P. ràpæ, the *primâ facie* difference is so wide, that any one would at once pronounce them distinct. But then, on the other hand, we find that intermediate specimens occur, which, presenting every possible shade and gradation of difference, appear naturally to connect and identify the two extremes; and it would be next to impossible to decide, in many instances, to which of the two these intermediate links should with most propriety be referred. The same observations apply also to the kindred species P. nàpi, the earliest spring specimens of which are smaller than those of the summer brood, paler in their markings above, and sometimes almost entirely destitute of them; and this species too, like P. brássicæ and ràpæ, is subject to endless variations. In the spring of the present year I took many specimens of the pale varieties of all three species (one of P. ràpæ so early as * March 18.), but I could not observe that any of the paler specimens of either kind occurred in the summer brood. In a note at the end of the volume, Mr. Stephens states his opinion, that P. Chariclè*a* and P. Mètr*a* are neither of them double-brooded, as he once supposed; and hence, perhaps, he would draw an additional argument in proof of their being distinct from P. brássicæ and ràpæ. But does not this circumstance, on the contrary, tend rather to show that the insects in question are merely varieties of the two last-mentioned species? For it certainly would be strange that two insects, which, to say the least of them, are so closely allied, in habit as well as in markings and appearance, to P. brássicæ and ràpæ, as to be generally confounded with them, and which, moreover, appear so early as the end of March or the beginning of April, should be only single-brooded, while their near allies P. brássicæ and ràpæ, which do not appear till later in the season, are known to produce two or more broods in the course of the summer.* No material difference has yet been observed in the caterpillar or chrysalis of the early whites, to distinguish them from P. brássicæ and ràpæ; and the distinctions in the markings, &c., pointed out by Mr. Stephens in proof of their being genuine species, seem scarcely sufficient to outweigh what may be urged on the other side. It is to be hoped, however, that, ere long, Mr. Stephens will decide the question, as he proposes, by rearing the insects from the egg. It is with some reluctance that I have ventured an opinion in opposition to that of so acute an observer as my friend, the author of *Illustrations of Entomology.* Should these remarks meet his eye, I trust he will excuse their freedom, my only object being the elucidation of the truth. Let me remind him of the memorable words of a great father in natural history, on an occasion when he found himself under the painful necessity of dissenting from the doctrine of a revered friend, ἀμφοῖν ὄντοιν φίλοιν, ὅσιον προτιμᾶν τὴν ἀλήθειαν. (*Aristot. Eth.*) †

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* This is the only instance I ever knew of any *Papílio coming forth from the chrysalis* so early in the spring; for although Vanéss*a* Ì*o*, Polychlòros, urtìcæ, and C. álbum, and Gonépteryx rhámni are often to be seen on the wing earlier in the month, and some of them occasionally in February or even January, these vernal specimens, it must be remembered, are such as have been produced in the preceding autumn, and have secreted themselves during the winter in the winged state.

Allesley Rectory, Oct. 30. 1828. W. T. Bree.

P.S. — The figure of P. Mètr*a* (Vol. II. p. 227. fig. 57.) is too large, and the spots and markings far too strong. If Mr. Rennie advocates the doctrine that P. Mètr*a* is a distinct species, he (or the artist employed) has not made the most of the case, by giving such a figure as the one referred to, which appears to be nothing more than a faithful representation of the genuine P. ràpæ. He might with truth have represented the insect considerably smaller, and with the black tips and spots scarcely visible. Several of such nearly immaculate specimens I took this season (1830), at the end of March.

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* Of P. ràpæ there appears to be a succession of broods throughout the summer and autumn. There would, of course, have been at least two (viz. the spring and summer) broods previously to the 1st of August, on which day, in the present year, I saw a specimen come forth from the chrysalis; and another, which I had in confinement, came out on the 29th of September. Probably P. brássicæ and nàpi are equally productive.

† Aristotle is alluding to his friendship for Plato; and observes, that, though both are dear to him, it is best, before all things, to respect the truth.

I cannot but regret, that, in Mr. Rennie's useful paper, there is no figure of P. Napæ'æ; which ought on no account to have been omitted, if a specimen could have been procured for the purpose. Perhaps he will favour us with one on some future occasion. — W. T. B.

Art. IX. *On the Gooseberry Grub.* By E. S.

Sir,

As the season is at hand when the gooseberry leaves begin to shoot, a few remarks on what is commonly called the grub, which commits sad ravages on the foliage of these shoots, may not be unacceptable. Early in March, if the weather is favourable, the first flies issue from their chrysalis, a few inches below the soil, at the foot of the trees; and, by a sharp-sighted observer, may be seen about nine or ten o'clock in the morning, should the sun be shining, hovering over the gooseberry trees; and, every now and then, settling on a leaf, vibrating their antennæ in bustling action, searching for a suitable leaf whereupon to deposit their eggs: and every fly destroyed at this period is, therefore, the ultimate destruction of some thousands of voracious successors. If carefully watched, after having made choice of a leaf, it will be observed retiring to the under side; where, in course of time, it deposits, along the stronger fibres or veins of the leaf, a series of eggs, which appear like small pellucid oblong strings of delicate beads, following the lines of the foliatory nerves. The following observations on the times of hatching, &c., may be relied upon as accurate: — On the 9th of April the eggs were laid; on the 19th they were hatched; and if the temperature is mild, they increase rapidly to maturity: and from their numbers (for a single fly will fill up the veins of many leaves), the foliage of the devoted tree is soon destroyed. They usually continue in the larva state about ten days; when, dropping to the earth, they penetrate below the surface, and change into a small brown chrysalis; in which dormant state they remain from fourteen to seventeen days, and then come forth as flies, which, in a day or two, lay their respective quantities of eggs; and, thus, brood after brood is continued indefinitely; and I am not aware that any limits of season act as a check, unless attended with decrease of temperature, which, of course, puts a stop to their progress. One mode of guarding against the evil I have already noticed, but the most keen-sighted gardener can never effect the destruction of the original stock of these vernal progenitors. He should, therefore, from the first moment of seeing the flies hovering about his trees, keep a sharp look out on the leaves, particularly those near the lower part of the stem, which are their most favourite resort; and as soon as he sees a small perforation, at first scarcely bigger than a pin's head, let him diligently examine the tree, and carefully remove every infected leaf. No labour will be better repaid than this. I have usually turned in a troop of little boys, who can easily insinuate their fingers amongst the branches; and, with a little practice, they become expert in plucking the egg-bearing leaves, for which they are paid at a certain rate per hundred; collecting them in a basket, the contents of which should be burnt or scalded, so as to prevent the escape of a single grub. Another remedy might be resorted to in gardens much infected with this nuisance; namely, taking the trees carefully up, and transplanting them in new ground very early in the spring; and then soaking the holes from which they were taken with quicklime and scalding water; though, such is the impenetrable case of the cocoon in which the chrysalis is enshrined, that I have my doubts whether this precaution, however severe, will in all cases answer. It might be supposed that, by carefully examining the soil, great numbers might be taken: but this is not the case; for, whether from a glutinous quality in the external shell of the cocoon, or other cause, I know not, minute particles of earth adhere to it in so singular a manner, that I found it almost impossible to discover a single individual in the earth of a small flower-pot, in which, to my certain knowledge, a considerable number had buried themselves; and from which, in fact, after I had searched in vain, when their hour of release was at hand, they emerged in full force. I have made a drawing of the insect: one with its wings spread; the other, as it usually rests when alighting on a leaf. (*fig.* 43.) The dark spot upon the upper wing is an infallible mark whereby to distinguish them from some other small ichneumon flies resembling them, at least not easily distinguished by persons who are not naturalists. The under side of the leaf is given for the purpose of showing the mode in which the eggs are arranged like necklaces of small pellucid beads. The Linnean name of the insect is the *Ten*thrèdo càpreæ. (See Turton's *Linnæus*, vol. iii. p. 418.)

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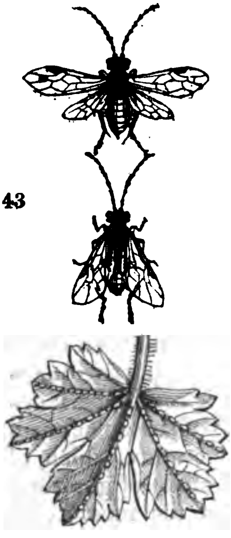


I am, Sir, &c.

Feb. 6. 1830. E. S.

ART. X. *On the Periodical Appearance of certain Insects.* By J. H. DAVIES, Esq., Lieut. R. M., late Curator of the Museum of the Portsmouth Philosophical Society.

Sir,

THAT certain insects occasionally appear very numerously, and are again for a period comparatively rare, has been long noticed by entomologists, and some instances are so striking, as to excite the attention of the most incurious observers; but I am not aware that any attempt has been made to ascertain whether the intervals are stated or irregular, or how far they are influenced by the temperature of the seasons. The observance of these interesting facts may perhaps form a desirable feature in your proposed Perennial Calendar of Nature: in the mean time, the prevalence of certain insects, as they came under my observation in this neighbourhood (Portsmouth) during a few seasons past, may perhaps be worthy of note.

1825.—*P*apílio cárdui, Painted Lady Butterfly, is one of this tribe, mentioned as an occasional visitant. This year I found a field of red clover completely covered by them; since when they have been scarce. *P*apílio cardámines, Orange Tip, was also particularly numerous. The genus Chrysomèla was very plentiful; a long hedge near Milton was crowded with the C. aúcta, C. Marshàm*i*, and others. I have since visited the same spot without success.

1826.—*P*apílio cratægàta, Black-ribbed Butterfly, is rather a local insect. In the previous summer I met a scientific tourist from Suffolk, who informed me that he had visited Hants to procure this insect, which he understood was here plentiful: we searched for it several days to no purpose; but this year they were more numerous than even the common Cabbage White, abounding in every field: since then very scarce. The *M*úsca genus unusually plentiful. Great numbers of *C*erámbyx violàceus were also taken. This year was marked by the prevalence of that pest to fruit trees, *P*halæ̀na *Neústria*, Lackey Moth. In the spring the boughs were covered with the webs of the larvæ; and so plentiful was the moth in the autumn, that more than one hundred flew into my study window on one evening; they have not since appeared in such numbers.

1827.—*P*apílio A'rgus, Argus Butterfly, studded the fields with its blue wings in unusual numbers. Híster quadrumaculàtus, of which I had previously taken few specimens, now covered Southsea Common, so that many were crushed under foot at every step; with them was *C*árabus cæruléscens, in equal numbers: and between the two a deadly war appeared to rage; they were found alternately the prey of each other all over the field. The present year they have disappeared. Cicindèla campéstris particularly numerous and active on dry sunny banks. The Hawk Moths (Sphínges) were very prevalent. Sphínx A'tropos, Death's Head Moth, usually rare, was to be met with in every potato field in the larva state: many were brought to me by gardeners, who did not appear to have noticed them before, from their enquiries whether they were poisonous reptiles, &c. S. ligústri, Privet Hawk Moth, was also numerous.

1828.—The present year does not appear to be very favourable to the production of insects. The Coleóptera have, however, been rather numerous: the Lepidóptera, on the contrary, scarce. Of the butterflies, Papílio Pàphia may be said to be more than ordinarily plentiful. Lucànus Cérvus, Stag Beetle, I do not remember to have seen so many in flight as have occurred on still evenings. In May a very large swarm of Scarabæ`us Melolóntha, Cockchafer, alighted in the gardens, but their stay was confined to a few days. It is more than seven years since the Scarabæ`us solstitiàlis, commonly taken for young cockchafers, was seen in any number. One insect, however, and that a troublesome one, has visited us in quantity far exceeding my previous experience; I allude to Stomóxys (Cònops) càlcitrans: they out-number the common house fly three to one; they much resemble them in appearance, and may, therefore, be overlooked; but the houses swarm with them.

I must not omit to notice the prodigious flights of Coccinélla septempunctàta, Lady Bird, which in 1826 visited this neighbourhood, so as to excite universal notice. They covered the fields in all directions, and even the streets of the town were filled with them: the whole genus was particularly abundant, but the smaller species were not so generally observed. I have found that these occasional visitations frequently extended to entire genera, though some one species, from its magnitude or beauty, was more particularly noticed.

These loose remarks will, it is hoped, induce some of your scientific correspondents to turn their attention to these interesting phenomena of the insect tribes.

I am, Sir, &c.

Portsmouth, Aug. 1. 1828. J. H. Davies.

Art. XI. *An Introduction to the Natural History of Molluscous Animals.* In a Series of Letters. By G. J.

Letter 4. *Benefits.*

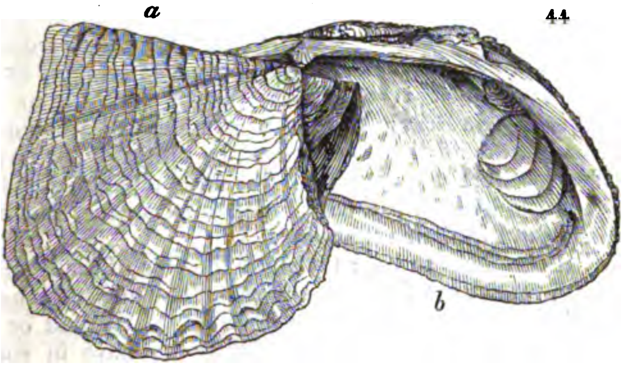
Sir,

So far from having, as you may suppose, estimated too highly the use of molluscous animals in the economy of nature, or exaggerated their importance to man, I, on the contrary, feel persuaded of having understated both; and it would have been easy for a naturalist, more favourably situated for investigation, to have made out a much "stronger case." Your future studies will soon convince you of this; and, in the mean time, the additional facts about to be detailed will prove that I have by no means exhausted my subject. To proceed.

Pearls are not, as poets have feigned,

> "rain from the sky,
> Which turns into pearls as it falls in the sea,"

but they are the morbid secretions of an oyster. Several species of *bivalved* shellfish produce them, but the greater number, the finest and the largest, are procured from the Meleagrìna margaritífera *Lamarck* (*fig.* 44. *a*), a native of the sea, and of various coasts. A considerable number are likewise taken from the Ùnio margaritífera (*b*), which inhabits the rivers of Europe; and it is singular, as remarked by Humboldt *, that though several species of this genus abound in the rivers of South America no pearls are ever found in them



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The pearls are situated either in the body of the oyster, or they lie loose between it and the shell, or, lastly, they are fixed to the latter by a kind of neck; and it is said they do not appear until the animal has reached its fourth year. They have a beautiful lustre, which must be familiar to you, but there is nothing peculiar in their chemical composition, consisting merely of carbonate of lime.

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* Personal Narrative, vol. ii. p. 282.

The Romans were extravagantly fond of these ornaments, which claimed the first rank after the diamond; and they gave almost incredible prices for them. Julius Cæsar presented Servilia, the mother of M. Brutus, with a pearl worth 48,417*l.* 10*s.*; and Cleopatra, at a feast with Antony, of which Pliny has given a long and interesting account, swallowed one dissolved in vinegar of the value of 80,729*l.* 3*s.* 4*d.* They wore them in great profusion, not only in the ears, and on the fingers, head, and neck, but strung over the whole body; and the men as well as the ladies were thus adorned. The naturalist, in deprecating this effeminacy, becomes eloquent, and in his censures there is something, perhaps, not inapplicable to ourselves: — "Quid undis fluctibusque cum vellere? Non recte recipit hæc nos rerum natura, nisi nudos. Esto, si tanta ventri cum eo societas, quid tergori? Parum est, nisi qui vescimur periculis, etiam vestiamur: adeo per totum corpus, anima hominis quæsita maxime placent." * (*Hist. Nat.*, lib. ix. c. 53.)

The principal fisheries of this people were in the Red Sea, the Gulf of Persia, and the Indian Ocean, the pearls from the former places being the most highly valued as superior in size and lustre; and it is matter of history that Cæsar was induced to invade Britain from some exaggerated accounts he had heard of the pearls of our coasts, or rather of our rivers; but if these were his object he was disappointed, for they were found to be of a bad colour and inferior size, nor have they improved in their reputation.

Ceylon continues to be, as it was in the time of the Romans, the most productive of these ornaments. The ancient fisheries in the Red Sea, however, are now either exhausted or neglected, and cities of the greatest celebrity have in consequence sunk into insignificance or total ruin. Dahalac was the chief port of the pearl trade on the southern part of the Red Sea, and Suakem on the north; and under the Ptolemies, or even long after, in the time of the caliphs, these were islands whose merchants were princes: but their bustle and glory have long since departed, and they are now thinly inhabited by a race of miserable fishermen. Nor are the rivers of Britain now fished, nor were they at any time of much value in this respect. Good pearls have indeed been occasionally found in our river muscle (Unio margaritífera), but too seldom to be worth the search. A notion prevails that Sir Richard Wynn of Gwydir, chamberlain to Catherine, Queen of Charles II., presented Her Majesty with one taken in the Conway, which is to this day honoured with a place in the regal crown. In the last century several of great size were gotten in the rivers of the county of Tyrone and Donegal, in Ireland. One that weighed 36 carats was valued at 40*l.*, but being foul lost much of its worth. Other single pearls were sold for 4*l.* 10*s.*, and even for 10*l.* The last was sold a second time to Lady Glenlealy, who put it into a necklace, and refused 80*l.* for it from the Duchess of Ormond. In his tour in Scotland, in 1769, Mr. Pennant, from whom I have borrowed the above particulars, also mentions a considerable pearl fishery in the vicinity of Perth, from which 10,000*l.* worth was sent to London, from 1761 to 1799; but, by the indiscriminate destruction of the muscles, the fishery was soon exhausted.

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* "What have the waves to do with our garments? That element does not rightly receive us unless we are naked. Grant that there is so great a communion betwixt the sea and the belly, what has the sea to do with the back? It is not enough that our food is procured through perils, if perils are not also encountered for our raiment. Thus in all that pertains to the body, things acquired at the risk of human life are most pleasing."

After the discovery of America the traffic in pearls passed, in a great measure, from the east to the shores of the western world. The first Spaniards who landed in Terra Firma found the savages decked with pearl necklaces and bracelets; and among the civilised people of Mexico and Peru they saw pearls of a beautiful form as eagerly sought after as in Europe. The hint was taken; the stations of the oysters were sought out; and cities rose into splendour and affluence in their vicinity, all supported by the profits on these sea-born gems. The first city which owed its rise to this cause was New Cadiz, in the little island of Cubagna; and the writers of that period discourse eloquently of the riches of the first planters, and the luxury they displayed: but now not a vestige of the city remains, and downs of shifting sand cover the desolate island. The same fate soon overtook the other cities; for from various causes, and particularly from the never ceasing and indiscriminate destruction of the Meleagrìnæ, the banks became exhausted, and towards the end of the sixteenth century this traffic in pearls had dwindled into insignificance. Of its value, when first established, the following extract will give you some notion:—" The *quint*, which the king's officers drew from the produce of pearls, amounted to 15,000 ducats;

which, according to the value of the metals in those times, and the extensiveness of the contraband trade, might be considered as a very considerable sum. It appears that till 1530 the value of the pearls sent to Europe amounted yearly, on an average, to more than 800,000 piastres. In order to judge of the importance of this branch of commerce to Seville, Toledo, Antwerp, and Genoa, we should recollect, that at the same period the whole of the mines of America did not furnish two millions of piastres, and that the fleet of Ovando seemed to be of immense wealth, because it contained nearly 2600 marks of silver. Pearls were so much the more sought after, as the luxury of Asia had been introduced into Europe by two ways diametrically opposite; that of Constantinople, where the Paleologi wore garments covered with strings of pearls; and that of Grenada, the residence of the Moorish kings, who displayed at their court all the luxury of the East. The pearls of the East Indies were preferred to those of the West; but the number of the latter which circulated in commerce was no less considerable in the times which immediately followed the discovery of America. In Italy, as well as in Spain, the islet of Cubagna became the object of numberless mercantile speculations." (*Humboldt's Personal Narrative*, vol. ii. p. 279, 280.)

At present Spanish America furnishes no other pearls for trade than those of the Gulf of Panama, and the mouth of the Rio de la Hacha. The bulk of them, as I formerly mentioned, are procured from the Indian Ocean, particularly from the Bay of Condeatchy in Ceylon, the Taprobane of the Romans. You will naturally enquire of me how it has happened that in all other stations the oysters have disappeared, while here they continue in undiminished numbers, though fished for centuries. The answer is that the fishery has been conducted in a different manner, and with an eye to the future. The banks, which extend several miles along the coast, are divided into three or four portions, and fished in succession; a repose of three or four years being thus given to the animals to grow and propagate. Further, the beds are carefully surveyed, and the state of the oysters ascertained, previously to their being let or farmed; and the merchant is permitted to fish them for only six or eight weeks: but from the number of holidays observed by the divers of different sects and nations, the fishing days do not in reality much exceed thirty.

The fishing season commences in February, and ends about the beginning of April. During its continuance, there is no spectacle which Ceylon affords more striking to a European than the Bay of Condeatchy. "This desert and barren spot is at that time," says an eye-witness, "converted into a scene which exceeds in novelty and variety almost any thing I ever witnessed. Several thousands of people, of different colours, countries, casts, and occupations, continally passing and repassing in a busy crowd; the vast numbers of small tents and huts erected on the shore, with the bazaar or market-place before each; the multitude of boats returning in the afternoon from the pearl banks, some of them laden with riches; the anxious expecting countenances of the boat-owners, while the boats are approaching the shore, and the eagerness and avidity with which they run to them when arrived, in hopes of a rich cargo; the vast numbers of jewellers, brokers, merchants, of all colours and all descriptions, both natives and foreigners, who are occupied in some way or other with the pearls, some separating and assorting them, others weighing and ascertaining their number and value, while others are hawking them about, or drilling and boring them for future use: all these circumstances tend to impress the mind with the value and importance of that object which can of itself create this scene." (*Percival.*) The inference is just, and yet when we remember in what manner and by whose means these vain ornaments are and have been procured, the impressions which such a gay scene conveys come not unalloyed. Poor negroes, sold to slavery, were compelled to dive for them, and we cannot read of the cruel treatment they received from the American Spaniards, without feelings of indignation and horror. Nor is it *methodistical*, but it is wholesome, to view the desolation which overtook their cities, and the departure of the "pomp of their strength," as the just punishment of their wickedness. The divers, I believe, now employed are not slaves, nor, I hope, are they maltreated: but still they drive a laborious trade, and one not void of danger; for the ground shark prowls among the banks, and is ever on the watch to devour them.

I will not dwell further on the importance of the pearl muscle, but shall leave you to form your own opinion on that point from the facts above stated. I must not, however, omit to remark that Linnæus in part owed his elevation to nobility to a discovery he made of causing the fresh-water muscle (U'nio margaritífera) of Sweden to produce pearls at his pleasure. It is conjectured that he accomplished this by drilling small holes through the shells, but his method is not certainly known, nor is this of any consequence, since it seems to have been soon abandoned. The States of Sweden viewed it at first in such an important light that they rewarded the illustrious naturalist with a premium of 1800 dollars (about 450*l.*), which in that country must have been a very considerable sum.*

Pearls are the toys of civilised nations, while shells themselves become the pride and ornament of savage tribes; for it is in poetry only that we find damsels who think themselves

—— "when unadorn'd
Adorn'd the most."

A negro Venus with a large cowry (Cypr*æ̀a*) for an ear-pendant, another for a nose-jewel, and a string of volutes for a necklace, may, in the opinion of your fair lady, have a very ridiculous and childish taste, but, in reality, the one values her pretty shells as highly as the other doth her pearls. And this is no idle supposition: for I remember that Sir J. Banks could not, by any present, induce an Otaheitan girl to part with her native ornaments; and some tribes so curiously and neatly form their shells into festoons and bracelets, and wear them so gracefully, that even European travellers have expressed admiration of them. Some years ago I saw, in the museum of Mr. Bullock, a very magnificent piece of dress of this kind. It was the chief mourner's dress of ceremony at the funerals of Otaheite. The part worn over the face was made of large plates of mother of pearl shell fastened together with fibres of the cocoa nut; and the elaborate drapery stretched across the breast was composed of several thousands of pieces of mother of pearl, each separately drilled and fastened together in a manner that would be found difficult for a European artist to copy, with the advantage of iron tools, which were then totally unknown to these interesting islanders.

To many people shells serve many purposes more useful than that of ornament. You must have read that in India, and among the various nations in Africa, a species of cowry (Cypr*æ̀a* monèta) is the current coin; and in the *Travels* of Park you may see a table of their comparative value. The Iroquois, and other North American tribes, make their *wampum*, which serves the purpose of records, from portions of perlaceous bivalve shells; and they seem to have another sort of *wampum* made with a species of Cássis *Lamarck*, which they string into a belt, and, according to Mackenzie, invariably present to strangers when they form or recognise a treaty of amity. The thin inner layers of some large flat shells, when polished, are used instead of glass for windows in the south of China and in India. Many of the domestic utensils of savage people are shells, and you must have observed that we have frequently imitated these in our porcelain. In India they form drinking cups of the *N*aútilus *P*ompílius, which they render costly by painting devices on their outer surface; and in other less civilised nations shells are converted into knives, spoons, fishing-hooks, and even into razors. Their musical instruments also are often formed of large univalves, particularly of *T*rìton variegàtum *Lamarck;* and though the music may be more loud than harmonious, it yet serves the purpose.

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* The above account of pearls and of the pearl fishery has been drawn up from the following works: — *Plinii Hist. Nat.*, lib. ix.; Adams's *Roman Antiquities;* Pennant's *Brit. Zoology*, vol. iv. p. 163.; Humboldt's *Personal Narrative*, vol. ii.; Bruce's *Travels in Abyssinia*, vol. ii. p. 246—249., &c.; Percival's *Ceylon;* Pulteney's *Life of Linnæus*, by Dr. Maton, p. 92, 93. and 550.

——"The shell proclaims
Triumphs, and masques, and high heroic games." *

Even in our own country, in the days when Ossian sang, the flat shells of the scallop (*P*écten máximus) were the plates, and the hollow ones the drinking cups, of Fingal and his heroes; and hence the term *shell* became expressive of the greatest hospitality. "Thou, too, hast often accompanied my voice in *Branno's hall of shells.*" "The *joy of the shell* went round, and the aged hero gave the fair." And there are many passages of a similar import in the poems of the Celtic bard. Now this shell is devoted to much less honourable purposes, the modern maiden of the Western Isles skims her milk with it, or forms it into a spoon for lifting butter, and none can be more elegant and better suited to the purpose. In Zetland the Fùsus antiquus *Lamarck* (*fig.* 45.), suspended horizontally by a cord, is used as a lamp, the canal serving to hold the wick, and the cavity to contain the oil. Examine the sketch, and then tell me if it is not probable that some of the most elegant patterns left us by the Greeks have been suggested by a similar primitive practice?

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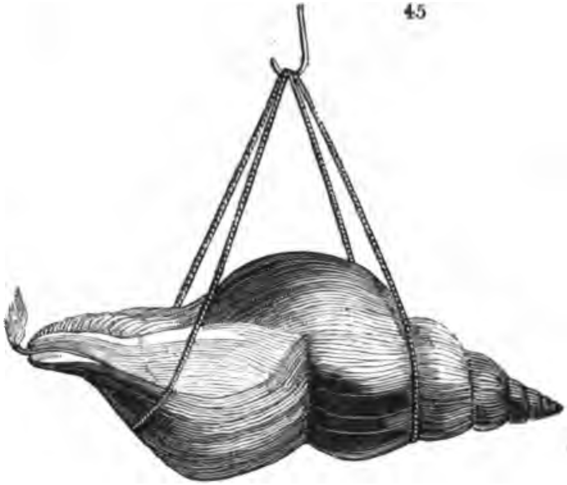
* Pietro Martire thus describes a custom of the native Americans: — "The doors of their houses and chambers were full of diverse kindes of shells, hanging loose by small cordes, that being shaken by the wind they make a certaine rattelling, and also a whistling noise, by gathering the wind in their holowe places; for herein they have great delight, and impute this for a goodly ornament." *Southey's Madoc*, vol. ii. p. 224. Hence Southey, in his description of the Festival of the Dead: —

——"Not a sound is heard,
But of the crackling brand, or mouldering fire,
Or when, *amid yon pendent string of shells*,
The slow wind makes a shrill and feeble sound,
A sound of sorrow to the mind attuned
By sights of woe."



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A few shells have been applied to religious purposes. Reversed varieties of the Turbinéllus pýrum *Lamarck* are held sacred in China, where great prices are given for them; and they are kept in pagodas by the priests, who on certain occasions administer medicines to the sick from them, and also use them to anoint the emperor at his coronation.[*] Blumenbach informs us that the same shell is made into arm and finger rings, and worn by the poorer Hindoos. After their death, these rings are thrown by their relations into some holy river, and never again taken up by any of the people; hence, he adds, the great consumption of such rings, and the importance of the fishery for the shells from which they are manufactured.[†] In the dark ages, a scallop (*P*écten máximus or operculàris), fixed to the hat in front, was the emblem of the pilgrim journeying to the Holy City[‡]; and to this custom allusion is occasionally made by our poets and popular writers. Thus the love-crazed Ophelia in her song: —

> "How should I your true love know
> From another one?
> By his *cockle-hat* and staff,
> And his sandal shoon."

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[*] Dillwyn's *Descriptive Catalogue*, p. 569.

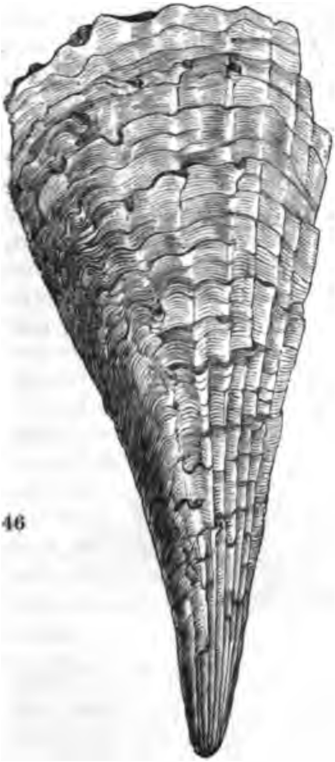
[†] *Elements of Natural History*, p. 260.

[‡] "It is not easy to account for the origin of the shell, as a badge worn by pilgrims; but it decidedly refers to much earlier Oriental customs than the journeys of Christians to the Holy Land, and its history will probably be found in the mythology of Eastern nations." — *Clarke's Travels*, vol. ii. p. 538. 4to.

And thus Parnell says of his hermit: —

> "To clear this doubt, to know the world by sight,
> To find if books or swains report it right,
> He quits his cell, the pilgrim staff he bore,
> And fixed the *scallop in his hat before.*"

You will now admit that the Mollúsca have contributed their due share to ornament "the outward man;" and you could scarcely expect such animals to do more in the way of clothing us. Nor do I mean to surprise you by finding amongst them a rival to the silk-worm, for indeed the claims of the silk-spinning Mollúsca are very trifling. But the *Pínnæ* (*fig.* 46.), a curious genus of the bivalved class, do spin a kind of silk, which has been woven into some articles of dress, which in early times were so highly prized as to be worn only by emperors and kings. This silk is the *beard*, or rather the cable, of the animal, by means of which it is moored to the rocks, in the same manner that our common muscle is. In a crude state the silk is called *lana penna.* It is cleansed from its impurities by washing in soap and water, drying and rubbing with the hands. "It is then passed through combs of bone, and afterwards, for finer purposes, through iron combs, or cards, so that a pound of the coarse filaments is usually reduced to about three ounces of fine thread. When mixed with about one third of real silk, it is spun on the distaff, and knit into gloves, caps, stockings, vests, &c., forming a stuff of a beautiful brownish yellow colour (resembling the burnished golden hue on the back of certain flies and beetles), but very liable to be moth-eaten, and requiring to be wrapped in fine linen. A pair of gloves costs on the spot about six shillings, and a pair of stockings eleven; but its sale is not very extensive,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and the manufacture is peculiar to Taranto."* You can see a pair of gloves made of this material in the British Museum.

The most costly and brilliant dye of which we read in history was procured from shellfish. This is the Tyrian purple. Aristotle and Pliny give nearly the same account of the process by which it was procured. They tell us that the liquor was at first of the colour and consistence of thick cream, and was contained in a transparent and branching vessel, placed behind the neck of the animal. When the shells were small, the whole were bruised together in mills, but when large the fish were first removed, the receptacle containing the dyeing liquor taken out, laid in salt, and treated afterwards according to the rules of the art. It is very plain, from their account, that univalved shellfish did furnish this dye; and the opinion of Mr. Bruce, the traveller, that the purple-fish at Tyre was only a concealment of the Tyrian's knowledge of cochineal †, though very confidently given, has not the slightest probability.

The particular species of shells which furnished the true Tyrian dye are not, however, certainly known. There were two at least, and they may have been more numerous, since they were found not only on the coasts of Asia, and in the sea adjoining Tyre, but on the coasts of Africa and Europe. The shell described by Pliny as the *P*úrpura, corresponds very well with the *M*ùrex trúnculus of Linnæus (*fig.* 47. *e*); and

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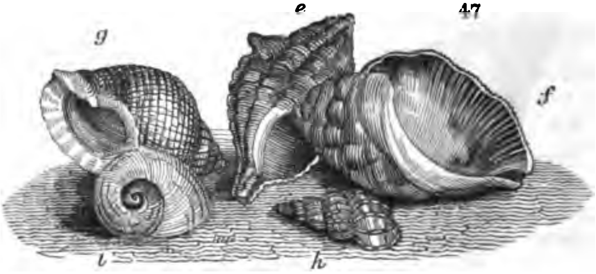

the *B*úccinum of the Roman naturalist may be the *P*úrpura pátula (*f*) of Lamarck. The *P*úrpura lapíllus (*g*) of our own shores furnishes a liquid of similar qualities, and may have been resorted to by the ancients; but to suppose that any portion of the celebrated dye was procured from either the Scalària clàthrus (*h*), or Iánthina vulgàris (*i*), or Aphýsia depìlans (Vol. II. p. 23. fig. 7. *c*), is idle conjecture, since the fluid excreted by them, however beautiful, agrees with the the true *Púrpura* in no circumstances except in colour.

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* *Edin. Encyclopædia*, vol. xii. p. 372.

† *Travels*, vol. i. p. 63. Introduction.

Poets as well as naturalists have lauded, you well know, the beauty and permanency of this dye, perhaps the principal commodity of Tyre, when its "merchants were princes, and its traffickers the honourable of the earth." It was discovered 1400, or, at the utmost, 1500, years before the Christian era, but from its scarcity, as much as from its brilliancy, was always very costly, and in consequence reserved for dyeing the hangings of temples, or the robes of priests and kings. Plutarch in his Life of Alexander, relates, that, among other valuables in the treasury at Susa, that conqueror found 5000 talents of it, which was perfectly fresh, though nearly two hundred years old; and its preservation was ascribed to its being covered with honey. "Pliny informs us that it was used by Romulus, and the succeeding kings of Rome, as well as by the consuls and first magistrates under the republic. The Roman emperors at last appropriated it entirely to their own use, and denounced the punishment of death against those who should dare to wear it, though covered with another colour. This absurd and tyrannical restriction confined the dyeing of the Tyrian purple to a few individuals; and in a short time the knowledge of the process was completely lost. In the twelfth century, neither the shellfish which furnished the dye, nor the methods which the ancients employed to communicate to cloths the rich and beautiful purple which it afforded, were at all known."

In 1616, Fabius Columna, a Neapolitan nobleman, wrote a dissertation on the *Púrpura*. It does not appear, however, that he had ever attempted to procure the colour; his object was rather to give a history of a forgotten art. But, in the year 1683, Mr. William Cole of Bristol made some experiments on the subject, being excited to do so by a report he had heard of a person living at a seaport in Ireland, who had made considerable gain by marking with a delicate durable crimson colour the fine linen of ladies and gentlemen, sent to him for that purpose; and that this colour was made by some liquid substance taken out of shellfish. He soon discovered that our common *Púrpura* lapíllus was the shellfish; and, as mentioned by Aristotle, he found the colouring matter "in a white vein, lying transversely in a little furrow or cleft next to the head of the fish." After an interval of twenty-four years, the same colour was procured from the same species of shell by Jussieu and Reaumur; and afterwards, in 1736, by Duhamel; and, when we compare the accounts of these eminent naturalists with those of Aristotle and Pliny, no doubt can remain concerning the identity of the modern with the ancient dye.

It forms no part of my plan to describe the process of dyeing with this fluid, but should you wish to procure it, remember that in the living animal it is not purple but whitish. When applied to linen, it appears at first of a pleasant green colour, and being exposed to the light, the green gradually increases in intensity, and at last changes to blue; the blue soon acquires a tint of red, and at last becomes a fine purple of great intensity. Beyond this no further change is produced; and as the fluid attains this its ultimate tint, with greater or less celerity, according to the intensity of the light to which the linen is exposed, there is reason to conclude that it consists of a base capable of uniting with various doses of oxygen, and of varying its colour, accordingly.

Mr. Montagu strongly recommends the use of this secretion for the purpose of marking linen, since it grows brighter by washing, and cannot, so far as is known, be removed by any chemical process. You may try the experiment; it will amuse you: but the Tyrian purple is eclipsed by several dyes of the moderns, and is disregarded by nations who have made any considerable advance in the arts. It is still used, according to Ulloa and other travellers, by the natives on some parts of the coast of South America, and by the Chinese. The latter also make a red ink of it, a purpose to which it was applied by the Byzantine writers, who esteemed it highly.* This reminds me that the ink of the ancients was sometimes prepared from the black liquor of the cuttle-fish; and from the same fluid the Chinese manufacture our black Indian ink, so much used by artists.

Amongst the Mollúsca there is not one which gives any essential aid to the physician, in his work of ministering to our ailments. In the *Natural History* of Pliny, indeed, there is a catalogue of medicines furnished by these animals sufficiently extensive and varied, but their reputation has passed away. For if oyster shells and the bone of the cuttle-fish (*Sèpia* officinàlis) still hold a precarious place in some pharmacopœias, it is more from respect to ancient usage, than from a conviction of their utility. Nor is there any benefit to be got from swallowing slugs (*Lìmax* agréstis) boiled in milk, nor from sucking the juice of shelled snails, though they were, and perhaps are, remedies in use among the lower orders, owing their popularity to a vulgar creed, that whatever is digusting and nauseous must necessarily be fraught with healing virtues.

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* This condensed history of the *Púrpura* has been drawn up from the following works:— Aristotle *Hist. Animal.*, lib. v. cap. 13.; Plin. *Hist. Nat.*, lib. ix.; *Edinburgh Encyclopædia*, vol. viii. art. Dyeing; Thomson's *History of the Royal Society*, p. 67. &c.; Beckman's *Hist. of Inventions*, vols. i. and ii.; Pennant's *Brit. Zool.*, vol. iv.; Montagu's *Test. Brit. Sup.*, p. 105—108. 120. &c.; *Cook's Voyages*, vol. i. p. 18. 12mo.

But, if poor in medicines of real efficacy, molluscous animals furnish several which are powerful through a superstitious faith. In South America, the *Pietros des los Oozes*, which are worn fragments of shells, are believed to be endowed with a sort of intelligence in removing extraneous bodies from the eyes, and are in consequence looked upon as something very wonderful.* The druggists of Venice sell the testaceous operculum of a species of Túrbo, the *U*mbilìcus Véneri*s*, as they call it, to cure the cramp, which it does miraculously, by being tied to the limb. In England the rustic maiden can read her fortune in the meanders of a snail: —

> "Last May-day fair I search'd to find a snail,
> That might my secret lover's name reveal.
> Upon a gooseberry bush a snail I found,
> For always snails near sweetest fruit abound.
> I seized the vermin, home I quickly sped,
> And on the hearth the milk-white embers spread.
> Slow crawl'd the snail; and, if I right can spell,
> In the soft ashes mark'd a curious L.
> Oh! may this wondrous omen lucky prove!
> For L is found in Lubberkin and Love." GAY.

And, in my younger days, I remember the country schoolboy, while strolling, with satchel on his back, from his hamlet to the neighbouring village, would stay to solicit, by doggerel rhymes, the black slug (*L*ìmax àter) to protrude its horns; and, having seized them according to the prescribed rules, would go on his way with a gayer heart and elevated hopes. Ay, and I have envied the better fortune of my fellow who could tell, by the sounding of his whelk, of storms at sea, and of the fluxes of the tide! For, with Wordsworth, I have seen

> "A curious child, who dwelt upon a tract
> Of inland ground, applying to his ear
> The convolutions of a smooth-lipp'd shell;
> To which, in silence hush'd, his very soul
> Listen'd intensely, and his countenance soon
> Brighten'd with joy; fór murmurings from within
> Were heard, — sonorous cadences whereby,
> To his belief, the monitor express'd
> Mysterious union with its native sea."

These notices you may think trifling, and somewhat out of place; but I have ever taken an interest in the superstitious practices of the vulgar, and in return for the pains I take to cater for your information, you must occasionally allow me to digress, and indulge my own peculiar humour.

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* The same superstition is said to prevail in Guernsey.

I am, Sir, &c.

G. J.

Art. XII. *Illustrations of Antediluvian Zoology and Botany.*

By R. C. Taylor, Esq. F.G.S.

(*Continued from* p. 78.)

One of the principal objects of geology is to distinguish the different epochs which have succeeded each other during the formation of the globe. This is best effected by means of the organic remains contained within the strata.

Mineralogical characters are found to vary so frequently, while zoological analogies are comparatively so constant in the same epochs or formations, that geologists feel assured of the superior value of these latter tests. " In those cases, where characters derived from the nature of the rocks are opposed to those which we derive from organic remains, I should give," M. Brongniart remarks, " the preponderance to the latter." *

In tracing any of our best recognised English formations, we cannot but be struck with the applicability of this reasoning. At the same time it would be too much to expect the complete identity, the perfect similarity, of these and other formations, at remote points, without occasional zoological as well as mineralogical deviations from that which we have been accustomed to consider the type. All formations possess local modifications. We might instance, as most familiar to us, the variations in the zoological characters of the London clay, at several points where sections are exposed. Thus at Harwich, at Sheppy, at Bognor, Stubbington, and Barton, are deposits of Testàcea, which may, so far as we know, be almost local. The plastic clay has equally local accumulations of shells. Nor is the circumstance at all remarkable; for it is repeated in the beds of living shellfish, and marine exuviæ, upon our present coasts; and no one acquainted with the gregarious habits of this part of the creation would look for an equal distribution of their remains, either on our shores or in their fossil state.

It is proposed to comprise within the limits of the present and a succeeding article, an outline of the principal departments of fossil natural history, which we shall endeavour to elucidate by original or well authenticated illustrations.

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* Address to the Academy of Sciences *On the Importance of Zoological Characters in Geology*, by M. Brongniart.

VEGETABLE REMAINS.

No complete treatise on geological botany has hitherto appeared in this country. Mr. Parkinson's first volume, it is true, is dedicated to the consideration of the vegetable kingdom. It contains descriptions and beautiful figures of many varieties of fossil wood, plants, flowers, seeds, and fruits, from various parts of Europe, and treats of the mineral and petrifying processes to which they have been subjected. But at the period this writer commenced his labours, no systematic classification or nomenclature had been formed, nor was it known that this class of fossils was so numerous.

The great source whence our geologists have hitherto drawn their knowledge of antediluvian plants, is the splendid work, the *Flora der Vorwelt*, of Count Sternberg.

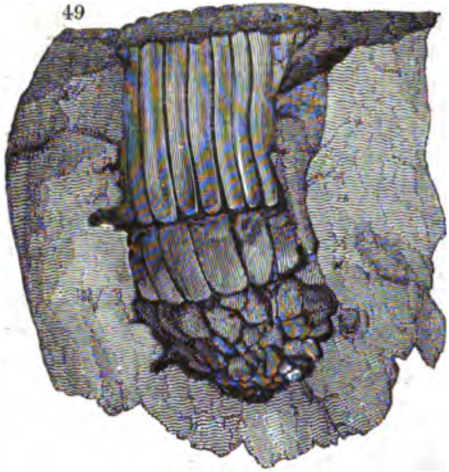
In England the coal formations are particularly rich in beautifully preserved plants. So far as they admit of comparison, they approach those tribes of plants which now exist in warm climates, and luxuriate in moist situations. They consist chiefly of palms and arborescent ferns (*fig.* 48.), succulent plants, cacti, euphorbiæ, canes, reeds, and gramina. The trunks or stems thus discovered, belong principally to arundinaceous plants, approximating to those now known, partly to the palmaceous order, and partly to anomalous forms, constituting a transition between these and the coniferous plants.

48

Filicites.
Ferns, from coal shale, South Wales.

From the few comparisons which have been hitherto instituted between the plants of various distant coal fields, there is reason to conclude that they have a general resemblance in all parts of the world; and, if so, it contributes to establish a fact, on which much speculation has been employed, of the original uniformity of climate at those remote points on the earth's surface.

In the enumeration of coal vegetation, it will be perceived that it does not properly belong to hard or solid wood trees, but to plants possessing a succulent, fibrous, pithy, or hollow structure. The appearances presented by these vegetables also confirm this opinion: for it is observed that those stems which have preserved any thing like their original perpendicularity are filled with the argillaceous, siliceous, or other matrix, in which they happen to be embedded, whilst those which are inclined appear considerably compressed, and those placed horizontally are wholly flattened. In the South Wales coal basin some of the richest masses of iron ore occur, moulded into the forms of gigantic compressed stems of plants, and fluted reeds or canes. (*fig.* 49.) Leaves and pericarps of various unknown plants, and impressions resembling confervæ and gramina also occur in all the coal formations.



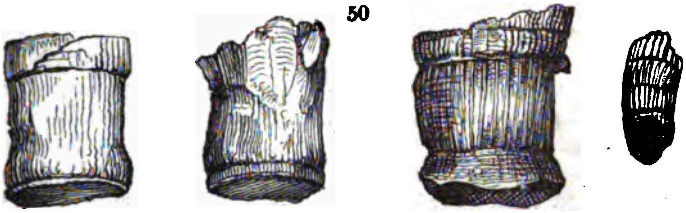
49

Part of a fluted stem from this district, one of the vascular cryptogamous plants of the coal; resembles Calamites decoràtus of Artis's *Antediluvian Phytology*, pl. 24., and also pl. 14. in the *Histoire des Végétaux Fossiles*, par M. Adolphe Brongniart. (The tubercles at the extremities of the striæ are not sufficiently marked in our figure.)

M. A. Brongniart has ascertained that the vascular cryptogamous plants had a vast numerical proportion in our great coal fields; “and, in fact, of 260 species discovered in this terrain or period, 220 belong to this class.”

Vegetables having some analogies to a few of the arundinaceous and succulent plants of the coal measures are occasionally traced in subsequent formations, amongst which the calcareous slate of Stonesfield is particularly distinguishable. Ferns, flags, gigantic reeds, and euphorbiæ occur in the lias, Whitby alum shale, and incumbent sandstone. Perhaps the most remarkable assemblage of plants of this tribe, after the coal measures, is found in the limestone slate and carstone of Tilgate Forest. Mr. Mantell enumerates impressions of succulent plants, approaching to the euphorbiæ, arborescent ferns, or palms, and unknown vegetables in a carbonised state; and considers that they assimilate to the vegetation of hot climates. With the invaluable assistance of Mr. Brown, in comparing these plants with recent specimens in his collection, it has been found practicable to point out, in the fossil Flora of Tilgate Forest, some genera which imperfectly approach such as are now in existence. Amongst these are the genera Zàmia and Cy̆cas, Dracæ̀na dràco, Căctus, and Filicìtes. (*fig.* 50.)

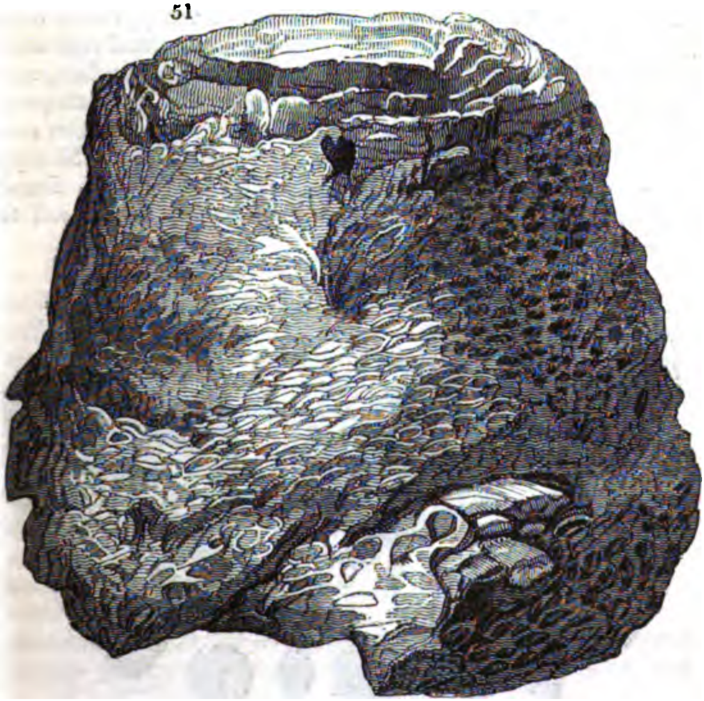
50



Jointed and fluted stems of plants [reeds ?] abounding in shale in the Hastings sandstone series. The fragments are introduced here chiefly because they do not appear in Mr. Mantell's *Fossils of Tilgate Forest.*

Some singular vegetable productions, which occur silicified in the freestone of the Isle of Portland, and are locally termed petrified birdsnests, have recently been subjected to the examination of Mr. Brown, Dr. Buckland, and Mr. Loddiges, who conceive them to be the bases of the stems of plants allied to Zàmia and Cy̆cas, and their structure is such as to suggest their forming a link between the coniferous plants and the Cycàdeæ. (*fig.* 51.) These also are proper to tropical climates.

51



Cycadeöidea microphy̆lla, silicified in the Portland oolite. *Trans. Geol. Soc.*, vol. ii. pl. 49. fig. 2.

Wood, properly so called, is more or less abundant in the higher secondary strata. In none are they of more interesting character than in the Portland limestone, where enormous silicified trunks are frequently discovered. Woody stems of dicotyledonous trees appear in the lias. The tertiary beds contain trunks and branches of trees, which are perforated by the *T*erèdo antenaútæ (Fistulàna personàta). In the London clay so extensively have their ravages prevailed, that it is rare to find any fossil wood free from them, and numerous instances are observed where the original mass has been almost entirely occupied by congeries of these animals. Fossil wood, perforated by the genus Phòlas, has been discovered in the ferruginous or lower green sand.

Leaves and fragments of arborescent plants occur in the calcareous laminated sandstones near Hastings, and also in Tilgate Forest. They form a species of coal, or Surturbrand, in the plastic clay beds at Alum Bay, at Newhaven, and Corfe Castle.

Fruit- and *seed-vessels* occur in the Yorkshire oolitic coal shales, and abundantly in the London clay at Sheppy; but the number of species has been there greatly exaggerated, owing to the fancied resemblance which some of the pyritous concretions bear to organic forms. Those of undoubted vegetable and terrestrial origin are, however, extremely abundant, and appear to be closely allied to genera now existing in tropical regions. Seven hundred species are said to have been collected, by one individual, from the beach at the foot of Sheppy cliffs. On careful examination this number will be found exceedingly over-rated, and it may probably be reduced to about twenty species. (*fig.* 52.)

52

Seed-vessels from Sheppy of the natural size.

Accumulations of trees, called "subterranean forests," may be traced at intervals, along our eastern coasts. Some of them, apparently, are the remains of forests which clothed the surface of our soil prior to the last great geological epoch. Most of the trees of this class, although broken off, overwhelmed by tremendous violence, and often flattened by the pressure of diluvial and alluvial deposits, appear to occupy their original sites; their stumps still remain rooted in the soil on which they evidently once flourished. These lignites have been much confounded with others of obvious postdiluvian lacustrine origin.

Mosses, confervæ, and other equally delicate vegetable substances, preserved in agate and chalcedony, have been examined by Dr. Mac Culloch, who is inclined to refer their origin to a period nearly coeval with the earliest existence of organic matter.

Naturalists have often failed in their endeavours to identify the antediluvian plants with those now existing. They evidently flourished under a warm climate; but botanists hesitate to pronounce upon the species, or even the genera. In one instance, lately, a fossil plant has been determined with unusual precision. Under the name Trichómanes rotundàtus, Mr. Lindley has described a vegetable discovered within a nodule of argillaceous ironstone, which plant he does not hesitate to identify closely with one which is now only known recent in the deep forests of New Zealand.

Those who take an interest in comparative botany expect, with much satisfaction, *The Fossil Flora of Great Britain*, by Mr. Lindley and Dr. Hutton.

ZOOPHYTES,

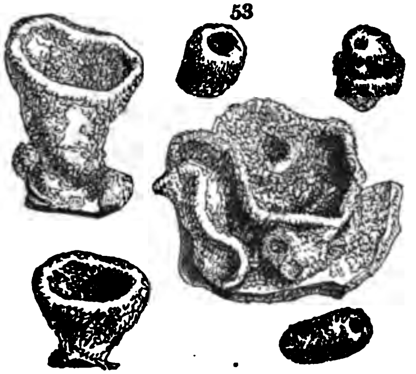
which form the link between vegetables and shellfish, are little less obscure than the plants; and we are again struck with the want of agreement between the organic productions of the ancient and of the present world. As far as the investigation has been pursued, it would seem that the zoophytes of those remote and mysterious times were not less numerous and beautiful than those of our own days.

Mr. Parkinson examined 176 fossil corals, and found nearly the whole differed from any that are now known. "In my attempt," says this able observer, "to preserve a parallel between the recent and the fossil species, I have been most completely foiled. Indeed, so little could this parallel be preserved, that I am under the necessity of acknowledging I am not certain of the existence of the recent analogue of any one mineralised coral."

Consistently with our plan of supplying illustrations of the principal departments of fossil zoology, rather than a perfect classification, we commence with the lowest in the scale of animated nature, arranged under the class

Sponges. —This tribe, whose structure approaches so closely to that of vegetables, is by no means abundant in the early ferruginous strata. It occurs plentifully in the ferruginous sand of Farringdon. (*fig.* 53.) The upper green sand contains a few species; the chalk formation abounds with them; and some spongiform varieties appear in the crag of Suffolk, but have not been properly examined. On account of the delicate texture of these bodies, and the filling up of their cellular cavities by the matter of their matrices, it is not often that they are sufficiently distinct to admit of ready examination.

53

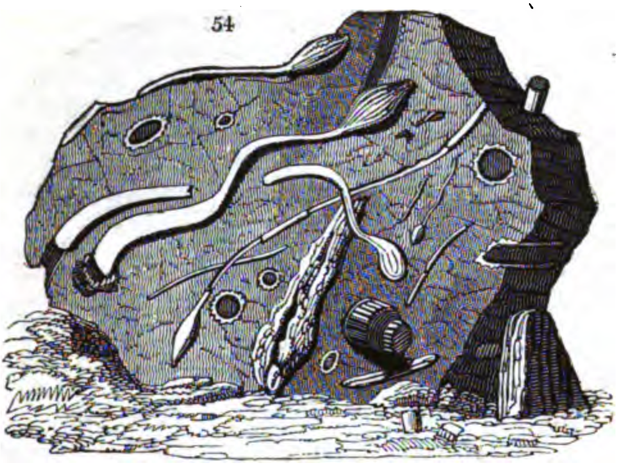


Sponges from Farringdon. The same species are figured in *British Mineralogy* under the name of *Spóngia pezizöides*, pl. 482. Green Sand.

The recent sponges, which are classed by M. Lamouroux under seven principal divisions, comprise 161 species. We have given two figures in this work, of *S.* oculàta and *S.* fluviátilis. (Vol. I. p. 278.)

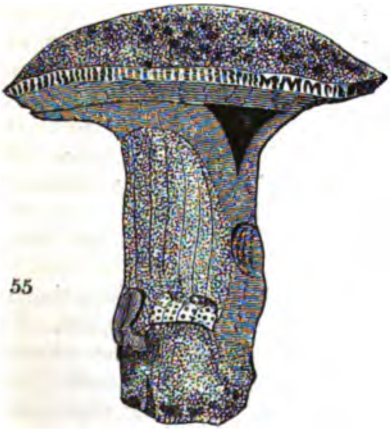
Siphòniæ are distinguished by their resemblance to flowers (whence their original name of Tulip Alcyonia), and consist of bundles of tubuli, derived from a pedicle, and passing through a spongious substance. Several species have been noticed by Mr. Townsend, Mr. Parkinson, and Miss Bennett. (Vol. II. p. 295. fig. 82., supra, represents a Siphònia from the green sand of Blackdown.) They are associated in the upper green sand, and their principal localities are the Vale of Pewsey, Warminster, the Isle of Wight, and Devonshire. Mr. Webster traced them in the limestone of Portland, and in the sandstone between the chalk and the gault on the south coast of the Isle of Wight. A beautiful series of illustrative drawings, by this writer, occurs in the *Trans. Geol. Soc.*, whence the following figure is derived (vol. ii. 1st series, pl. 28. fig. 3.). (*fig.* 54.)

54



Ventriculites. — Mr. Mantell has investigated this previously obscure class of fossils, and illustrated their peculiar conformation by an extensive suite of specimens in his *Geology of Sussex.* He conceives that this animal (for it really appears to be one animal, rather than a congeries) possessed the powers of dilatation and contraction of its disk, which accounts for the almost infinite variety of form which individuals of the same species are seen to present. (*fig. 55.*) It is fair to state that Dr. Fleming objects to this hypothesis, and is disinclined to remove them from the Spóngiæ. Certainly the recent Spóngia otaheítea of Lamarck, also those of Ellis (tab. 59. figs. 1, 2, 3.), bear an extraordinary resemblance to the Ventriculites.

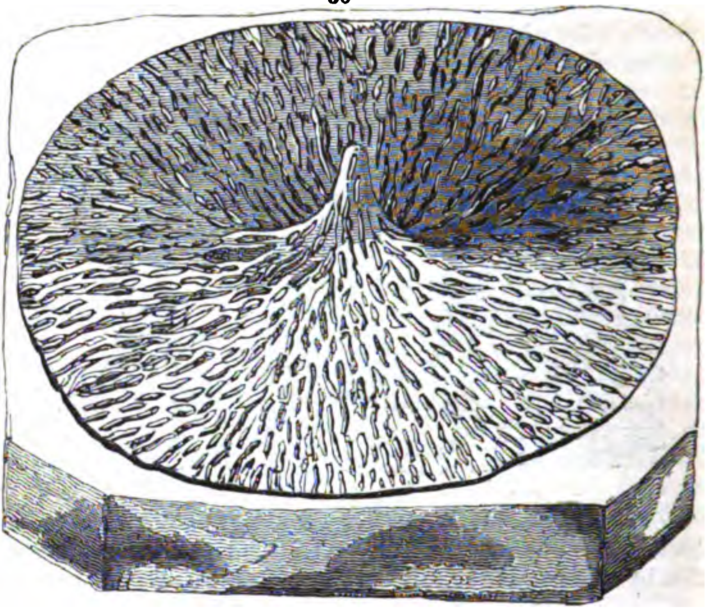
55



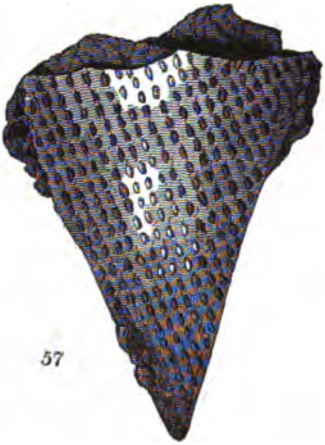
V. radiàtus *Mantell*, tab. x. Chalk.

Mr. Rose has furnished us (Vol. II. p. 335—339.) with several other illustrations of this zoophyte. The following figure from Mantell, tab. xiv. fig. 2. represents Ventriculìtes radiàtus, having the external surface completely expanded. (*fig. 56.*)

56



Of the same character is the following specimen, which was detached from its flint envelope. It much resembles, in the quincuncial arrangement of its tubes, Mr. Rose's fig. 100.; but ours does not exhibit the pedicle. (*fig.* 57., from Norwich.) Mr. Koenig appears to have figured this as Ocellària, *Icones Fossilium Sectiles*, fig. 98, 99.

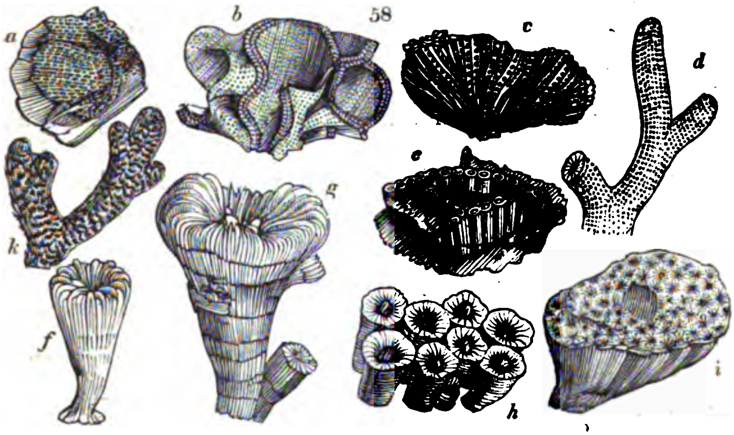


57

Alcyònia, the production or the habitation of polypes. The number of fossil bodies included under the original head of Alcyonites is much diminished since the families of *S*póngiæ, Ventriculites, Choanites, and Siphòniæ have been withdrawn from this division. They are chiefly limited to the chalk and chalk marl. Messrs. Coneybeare and Phillips conceived that the irregular cylindrical branches often found in the oolitic series, particularly in the great oolite, have derived their origin from *A*lcyònia. In an attempt to arrange the fossil Alcyonites, according to their characters in Lamouroux's table of 51 recent species, the result is rather an approximation to similarity, in a few cases, than an identification with any existing kinds. The recent Alcyònia are distinguished from the Sponges by having an external skin, full of openings, possessed by oviparous tentaculated hydræ.

Under the subdivisions, polypifers formed like network, foraminated polypifers, lamellated polypifers, cortiferous polypifers, &c., numerous genera have been described by Ellis and by Lamarck, and many fossil kinds are known in the English formations. They are extensively distributed, and abound particularly in the mountain limestone, the coral rag, and the crag. (*fig.* 58.)

58

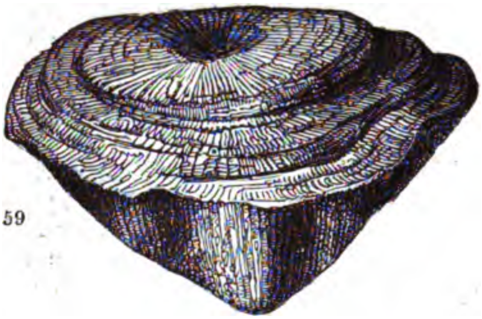


We have introduced into the following table some of the principal genera of fossil corals, &c.: —

a, Flústra, Suffolk, Crag,
b, E´schara, Aldburgh, Crag.
c, Retípora, Sunderland, Magnesian limestone.
d, Cellépora, Dudley, Moun. limest.
e, Catinípora or Tubípora, Chain coral, Mountain limestone.
f, Caryophyllæ`a, Norwich, Chalk.
g, Caryòphyllæ`a, Steeple Ashton, Coral rag.
h, Stylìna of Parkinson, Cumberland, Mountain limestone.
i, Astrèa, Mitford, Bath oolite.
k, Madrépora, Dudley limestone.

The Stylìna above given is by some called a ramose Caryophyllæ`a.

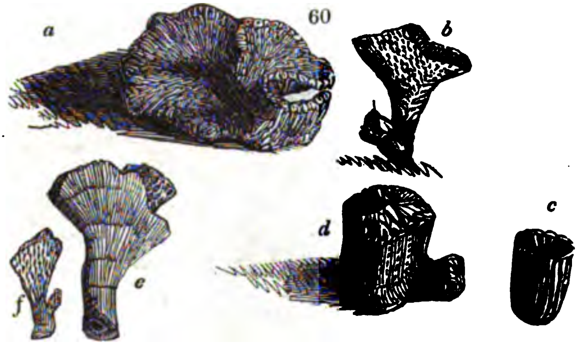
In the transition limestone, several fossil species are arranged under the genus Stylìna. "The recent species, which Lamarck considers as the type of this genus, was brought from the South Seas, and furnishes us with another instance of animals whose remains are found in formations of the earliest creation; no traces of which animals have been seen in any of the subsequent formations, but are now found in a living state in the seas of the opposite hemisphere." (*fig.* 59.)



Sarcínula angulàris of Dr. Fleming. It is similar to the porpital madreporite, *Org. Rem.* pl. vii. fig. 3. From Dudley limestone. Favosìtes alveolàta, Parkinson's *Introduction*, p. 69.

Among these deposits few are so rich in zoophytes as the crag, and none have been so much neglected. As most of these bodies have never been noticed before, we are induced to devote a larger space than this branch of zoology would otherwise be entitled to. They belong to a class not capable of easy identification, and are introduced here more for the purpose of attracting naturalists to their better consideration, than with the expectation of clearing up the obscurities which attend them. Several species may be traced referable to the genera Spóngia? Sertulària, Flústra, E'schara, Caryophyllæ'a? Retípora, Millépora, Turbinòlia, Corallìna?

60



a, Retípora?

b e f, E'schara.

c, Turbinòlia.

d, ——?

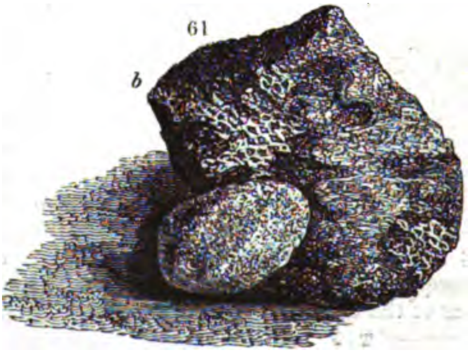


Fig. 61. A spherical body, of which great abundance exists in some localities; varying from the size of a pea nearly to a hen's egg. External surface covered with minute cylindrical pores. Interior construction exhibits numerous fine tubes, radiating to the external cells or pores.

Fig. 62. *a*, An elongated ramose body, probably a variety of the last, rather than a distinct species; its surface also covered with minute pores.
b, A longitudinal section, showing the direction of the tubercles, which form delicate striæ.

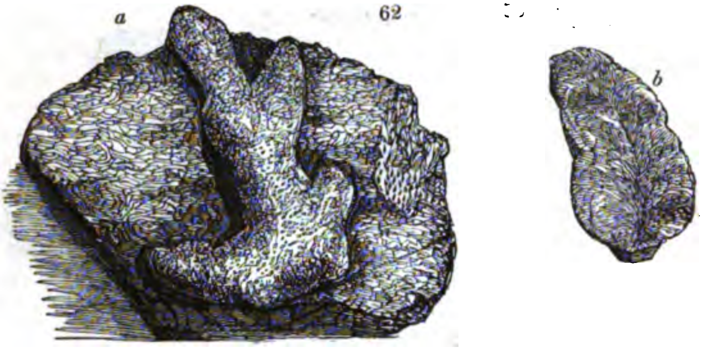


Fig. 63. A zoophyte, consisting of concentric series of bundles of tubes radiating from the centre. The figure exhibits a double section, illustrating its internal structure.

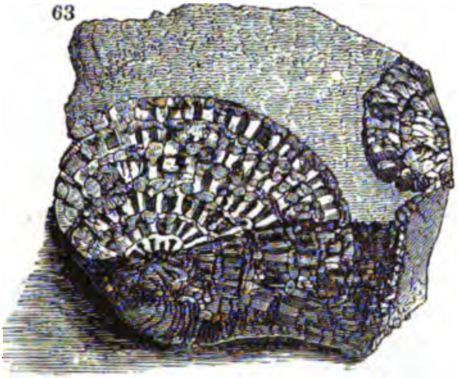


Fig. 64. Section of a similar fossil, showing the outer surface and the extremities of the bundles of tubes.

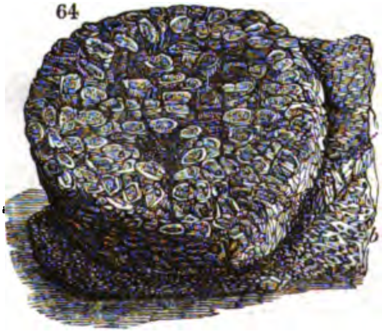
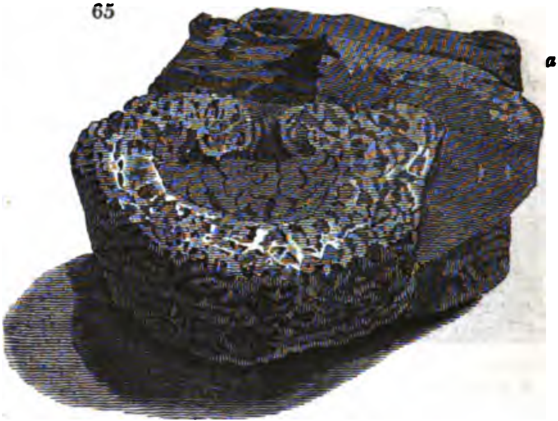


Fig. 65 *a*, Another crag zoophyte. Variable in form; sometimes expanded; sometimes collapsed, and often concave or cup-shaped. Has been figured, but not described, in Sowerby's *British Mineralogy*, pl. 481., with a coralline resembling Millépora foraminòsa.

65



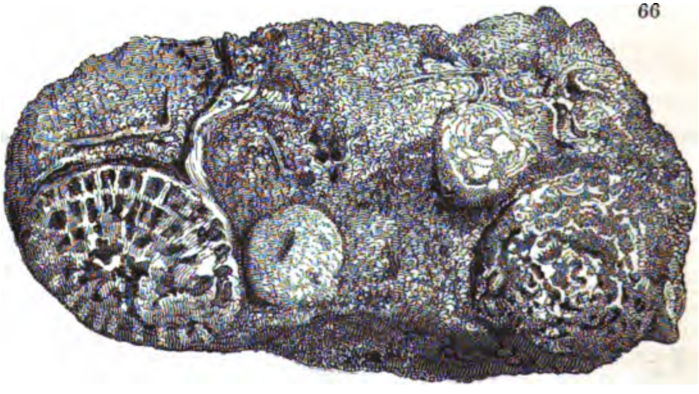
a

b

b, A section of the interior, showing its series of concentric coats, somewhat like an onion.

Fig. 66. A group composed of most of the foregoing species, and including E'schara, Flústra, &c. A small Cídaris and a portion of a Belemnite are also attached to this specimen.

66



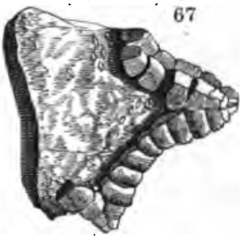
Retípora, resembling R. cellulòsa, covers a part of *fig.* 61. *b*, and *fig.* 64. *b*. The slabs to which these zoophytes are attached often resemble parts of a recent coral reef.

RADIA`TA.*

Stellèridæ, or radiated animals of a peculiar conformation, are divided into the four genera Comàtula, Eurỳal*e* (Astrŏphyton), *A*stèrias, and Ophiùra. Of these we have only space to notice

Astèrias, or star-fish, which contains several fossil species, but of rather rare occurrence. They belong chiefly to the chalk, wherein have been recognised four species, one of which is shown. (*fig.* 67.) Thirteen fossil *A*stèriæ are described in the same work. The rarity of perfect specimens of Stellèridæ is ascribed to the proneness to decomposition of the membranous connecting matter. *A*stèriæ have been observed in the oolites. In Vol. II. p. 73. supra, we have figured an unusually perfect one from the cornbrash. The figure given by Messrs. Young and Bird, pl. v. fig. 5., from the alum shale, seems to be an *A*stèria. The fossil remains of *A*stèriæ are said to approximate nearly to recent species; but this remark, probably, arose from the imperfect examination the subject has received. We have figured one of the recent *A*stèriæ (Vol. II. p. 115.) communicated by Mr. Thompson. Dr. Fleming describes eleven British species. Recent.

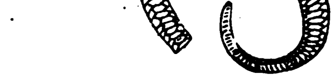
67



*A*stèrias, approaching to Pentagonáster, *Org. Rem.*, vol. iii. pl. i. fig. 1. It is the *Ast.* regulàris of Lamarck.

Ophiùra. — Beautiful star-fish, of the genus Ophiùra, have been noticed, by Mr. J. Phillips, in the marlstone of Yorkshire; by Messrs. Young and Bird, in the alum shale (pl. v. fig. 5.); by Mr. Miller, in the lias of Gloucestershire; and they appear, though very rarely, in the chalk. (*fig.* 68.)

68



Ophiùra Millèri, J. Phillips's *Geology of Yorkshire*, pl. xiii. fig. 20.

Crinöidea. — A considerable portion of his second volume is devoted, by Mr. Parkinson, to this class of zoophytes, the result of which is, that of the two great families of coralloids, the Encrinites and the Pentacrinites, of which 25 species and fragments of numerous others abound in a mineralised state, only one species, somewhat similar, but of great rarity was known to him in a recent state.* Since this great work appeared, the natural history of the Crinoïdea, or lily-shaped animals, comprising those formerly described as Encrinites and Pentacrinites, has been investigated with extraordinary perseverance and success by Mr. Miller. This family he subdivides into 9 genera and 25 species. The Encrinites are coeval with the earliest of the secondary rocks. (*fig.* 69.)

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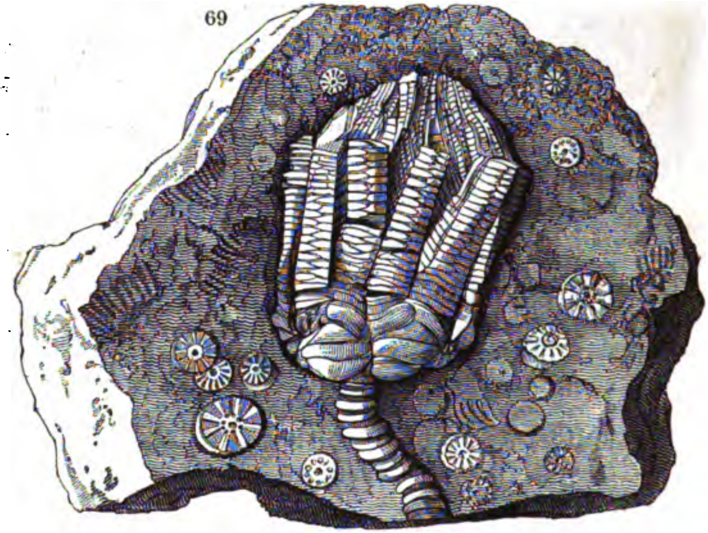
* "Having the organs of sense and motion disposed circularly around a centre or axis."

69



Lily Encrinite, *Org. Rem.*, vol. ii. pl. 14., characteristic of the Muschel-kalk, Germany; Encr. monilifórmis of Miller; Encr. lilifórmis of Lamarck.

Mr. Parkinson has shown that the lily encrinite was composed of nearly 30,000 distinct bones.

Pentacrinites may be traced through the beds of the lias, oolites, and chalk. Four of this family are found in the latter, with the genus Marsupite. In the lias of Dorsetshire they are said to occur frequently, adhering to wood. (*fig.* 70.)

Echínidæ, or Echinites.—Advancing in the scale of organisation, we have next to speak of a class of animals covered with a bony crust, and furnished with movable spines. This family is so numerous, that several naturalists, from Linnæus to Lamarck, have successively employed themselves to establish a lucid form of arrangement. Mr. Parkinson, in the

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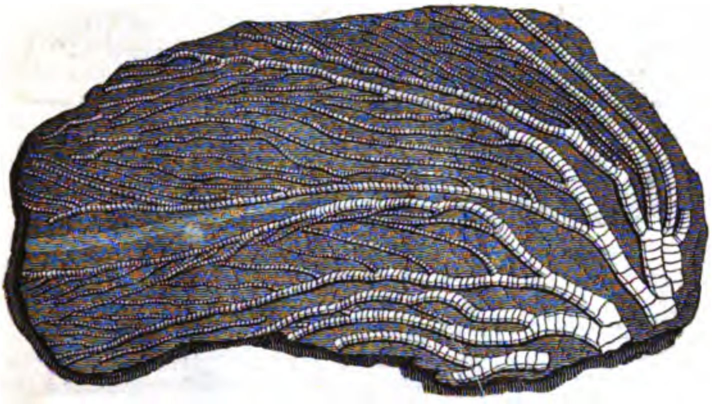
* This Pentacrinite was found on the coast of Barbadoes. A recent European Pentacrinite has since been discovered, which we have already figured in Vol. II. p. 114. of this Magazine.

70



Briarean Pentacrinite. A fragment from the Lias. Pentacrinites Briàreus.

Organic Remains, adopted the classification of Leske; but subsequently, in the *Introduction to the Study of Fossils*, pursued the more perfect system of Lamarck.

This arrangement we have endeavoured to illustrate by the following Table: —

RADIA'TA.

Order ÆCHI'NIDÆ.
Divisions.

EMMESO'STOMI.
Mouth central in base.
Classes.

I. ANOCY'STI.
Vent in the vertex.

II. PLEUROCY'STI.
Vent in the side.

III. CATOCY'STI.
Vent in the base.

APOMESO'STOMI.
Mouth towards the margin of base.
Classes.

IV. PLEUROCY'STI.
Vent in the side.

CLASSES.	GENERA.	SPECIES.			
		Recent.	Recent and Fossil.	Fossil only.	Total.
I. Anocyſti.	1. Æchinus, Sea Urchin -	10	7	7	24
	2. Cidaris, the Turban -	4	2	6	12
	3. Clýpeus, the Buckler -	—	—	10	10
II. Pleurocyſti.	4. Cassídulus, Helmet -	—	—	3	3
	5. Nucleolites - - -	—	—	4	4
	6. Echinaráchnius, Spider's Web	1	—	—	1
III. Catocyſti.	7. Galerìtes (Cónulus), Helmet	—	—	20	20
	8. Clypeáster, Buckler -	—	3	10	13
	9. Scutélla, Saucer - -	3	11 doubtf.	3	17
	10. Fibulària, Button - -	—	1	14	15
	11. Echinòneus - -	3	1 doubtful	—	4
IV. Pleurocyſti.	12. Ananchýtes, Helmet-shaped	—	—	12	12
	13. Spatángus - - -	9	3	11	23

These 13 genera are represented in the following figures, and their names, localities, and strata are given below: —

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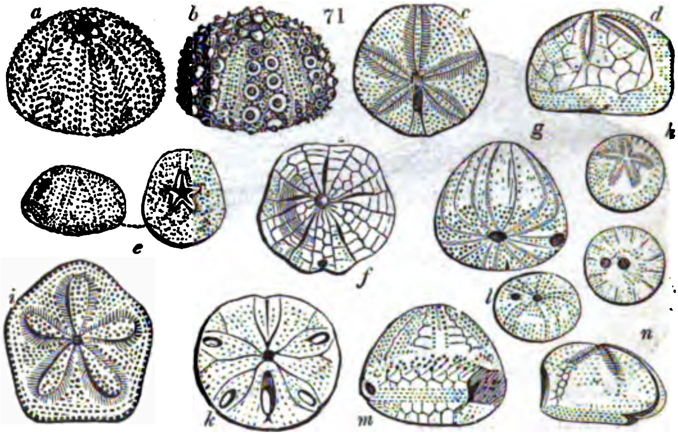


a, Echìnus, Calne, Coral rag.
b, Cídaris, Calne, Coral rag.
c, Clýpeus, Hampton Common, Great or Bath oolite.
d, Cassídulus, Wilts., Green sand.
e, Nucleolìtes, Normandy, Calcaire grossier?
f, Echinaráchn., recent, Parkinson.
g, Galerìtes, Wilts, Chalk.
h, Clypeáster, Hungary, Tertiary.
i, Scutélla, recent.
k, Fíbula, recent, *Encycl. Meth.*
l, Echinòneus, recent, *Enc. Meth.*
m, Ananchìtes, Norfolk, Chalk.
n, Spatángus, Norfolk, Chalk.

The number of English Fossil Species must at present be received as an approximation.

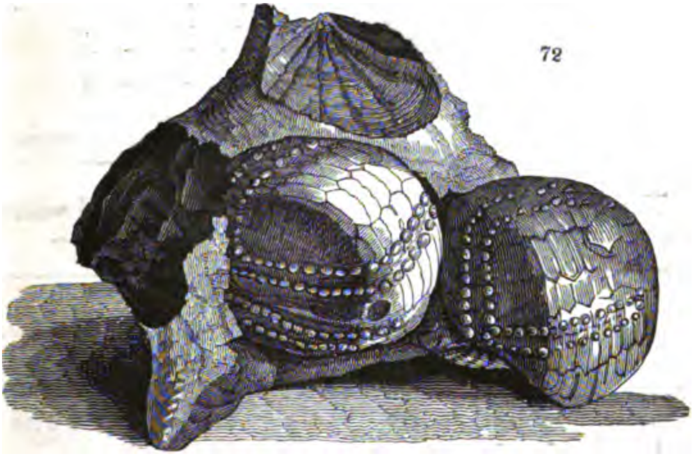
ANOCY'STI.	sp.	CATOCY'STI.	sp.	PLEUROCY'STI.	sp.
Crag	2 peculiar.	Chalk	11	Chalk	8
Chalk	2 peculiar.	Green Sand	1	Gault	1
Chalk and Green Sand	1 common.	Coral Rag	1	Green Sand	5
Green Sand	5 peculiar.	Calcareous Grit	1	Coral Rag	1
Coral Rag and Cornbrash	8 peculiar.	Cornbrash	1	Calcareous Grit and Oxford Clay	1
Cornbrash and Calcar. Grit	2 common.	Fuller's Earth	1		
Cornbrash and Oolite	9 common.	Under Oolite	1		
Under Oolite	3 common.			Total	16
Lias	1	Total	17		
Total	32				

The foregoing table contains 158 species, out of which number naturalists have been able to identify 16 species only, as agreeing with any now known, that is to say, occurring both in a recent and fossil state; 30 species were found in a recent state only; 12 species are not distinguished in the list, as to which class they belong; and the remaining 100 species are exclusively found in a fossil state. Sixty-five species are distributed in the English formations, and are almost entirely derived from the last-mentioned class.

Recent analogues of several of the fossil echinites exist in the South Seas. The British seas produce 7 recent species, according to Dr. Fleming.

Mr. Wm. Smith's *Stratigraphical Table of* Echìni ought not to be passed unnoticed here; and, although it is capable of extension from later discoveries, it affords a copious illustration of the geological position of this numerous order in the English strata. These fossils existed most abundantly in the chalk. One genus, Ananchìtes, containing many species, is known only in this formation, and has not been perpetuated in our present seas.

*E*chìni, of the genus Cídaris, first appear in the lias, but unfrequently. In the lower oolite several species abound, and the green sand is also rich in them. The crag contains a species from this genus. Mr. Parkinson notices that one genus, *S*patángus, appears first in the green sand, and then in the chalk; that it is absent in all succeeding formations, but that it is found again, living in the seas of the present world. Mr. Phillips, however, has observed *S*patángi much lower, having traced the same species in the calcareous grit, the coral rag, and Kelloways rock.



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Ananchìtes. Gàlea ovàta? A group of casts in flint from chalk, Norwich.

TESTACEOUS MOLLU´SCA.

Shellfish. — For convenience of arrangement, we separate this division into simple univalves, simple bivalves, ancient complicated bivalves, and multilocular or chambered univalves. From the first class some naturalists have withdrawn the tubular shells, to form a fifth under the head of Annulòsa; and even further subdivision has been made by other classifiers; while, again, in another case, the whole have been comprised in three classes, the Annelìdes, the Conchífera, and Mollúsca.

On the Continent this department was illustrated as early as 1775, in Knorr's magnificent *Recueil des Monumens des Catastrophes que le Globe de la Terre a essuiées.*

Mr. Sowerby's *Mineral Conchology of Great Britain* comprehends the greater portion of our fossil shells. Numerous additional species have, however, been described in other works; such, for instance, as those by Messrs. Young and Bird, Mr. J. Phillips, Mr. Mantell [*], and by contributors to the *Trans. Geol. Soc.* From sources so authentic, it is possible to form estimates which will now convey some notion of the numbers, the prevalence, and the geological distribution of our mineralised Testàcea. The augmentation which such a table is capable of receiving is not, in one point of view, very material; because it is not probable that the relative proportions which the respective classes bear to each other will be much affected by such addition. Proceeding at once to the result, the numbers and proportions are as follows: —

Simple Univalves, Gasteropodous Mollúsca - -	62 to 64 genera.
Simple Bivalves, Acephalous Mollúsca - -	69 or 71
Complicated Bivalves, in ancient formations - -	3 — 3
Multilocular, or chambered Univalves - } Cephalopodous Mollúsca -	12 — 12
In all	146 to 150 genera.

The geological distribution of species comprised within these genera is found to be in the following manner: —

	Simple Univalves, including the Tubular Species.	Simple Bivalves. Species.	Ancient Complex Bivalves. Species.	Chambered and Multilocular Shells. Species.	Total published species.
In the secondary and transition series of Britain - -	204	629	51	272	1156
In the tertiary formations - -	295	185	0	8	488
	499	814	51	280	1644

This number falls greatly short of the entire series. M. Deshayes has determined no less than 1200 species in the tertiary deposits alone of the Paris basin.

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[*] Mr. Mantell's *Tabular Arrangement of Sussex Fossils*, recently published by the Geological Society, furnishes an admirable condensation of local zoological information. Mr. J. Phillips's tables are also arranged with great care and ability.

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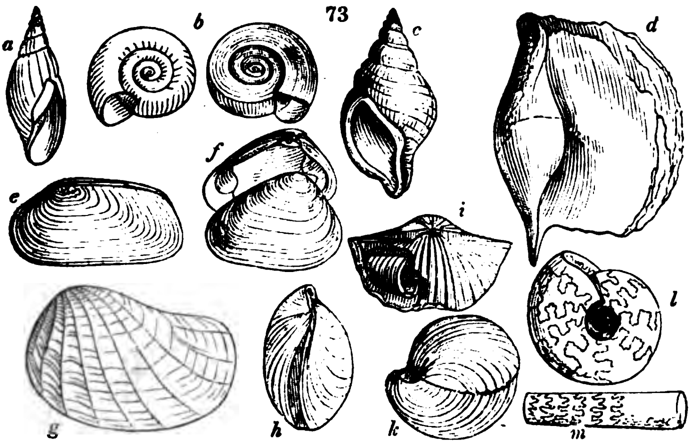

Illustrative Group of Shells: —

Univalves.

a, Limnèa, I. Wight, Fresh-water.
b, Planórbis, Isle of Wight, Fresh-water.
c, *Mùrex*, or rather Fùsus, contrà-rius; Suffolk, Grag.
d, Rostellària macróptera, Barton, London clay.

Bivalves.

e, U'nio, Hordwell Cliff, Fresh-water (lower).
f, Cỳclas, Woolwich, Freshwater (lower), or Plastic clay.
g, Pholadomỳa (Cardìta), Gloucestershire, Lias.
h, Terebrátula, Suffolk, Crag.

Complicated Bivalves.

i, Spírifer, Derbyshire, Mountain limestone.
k, Pentámerus, Ludlow, Transition limestone.

Chambered or Multilocular Univalves.

l, Ammon*ìtes*, Folkstone, Gault.
m, Baculìtes, Chalk and Chalk marl.

When the shellfish that inhabit our ocean are compared with the fossil tribes, essential specific differences are perceived; and these differences become more striking as we recede from the latest formations. In our crag and fresh-water beds some species may be discovered which possess a strong similarity, if not absolute identity, with those living in our lakes and seas. Even here, the identity is maintained but by a limited number, which are intermixed with numerous others that have no recent analogues. Investigations in fossil conchology lead, therefore, to one result; that, with the inconsiderable exceptions that have been stated, the species have not been perpetuated to our times.

We have seen that fossil remains of peculiar character occupy certain parts of the grand series of conchiferous deposits; but this transition is seldom abrupt. The same organic remains may still be traced at intervals, and sparingly, in subjacent beds. In the beds succeeding the chalk, we have a remarkable exception. At no point is there a more strongly marked change than is exhibited at the termination of this formation. The clays which follow are peopled by a multitude of animals differing essentially from all that had preceded them: an entirely new series, "not formed," as Mr. Parkinson observes, "by the gliding of one genus into another, or by changes induced in the structure of the animals, but, as far as the state of our knowledge will allow us to judge, by a new creation, adapted to the especial purposes which Providence had destined to accomplish."

One of the most remarkable facts elicited is, that certain Testàcea, whose genera were abundantly preserved and prolonged through so many formations, should now exist so sparingly, or be entirely lost. We might instance the Terebrátulæ, which abound no less in the mountain limestone than in the chalk, and in almost every intermediate rock, which are absent in nearly every one of our tertiary beds, and reappear in the most recent. Not less than 100 fossil species of Terebrátulæ, and myriads of individuals, are known to us; but the recent shells of this genus are comparatively few. Of Trigònia, also, 25 species are found in our strata, often abundantly, and terminating, like the Ammonites, with the chalk. Until lately, this genus was considered to be extinct; but one species has been discovered on the shores of New Holland. Of Ammonites, so profusely distributed, whose species amount, it is said, to no less than 200, and of which about 175 are known in the English formations, none now remain. 29 species of Prodúcta, 3 of Pentámerus, and 19 of Spírifer, inhabited the waters that produced the transition and mountain limestone, and contiguous shales; but these genera are altogether extinct. Indeed, almost the whole series of antediluvian multilocular shells seem to have shared a similar fate.

On the other hand, instances are no less abundant and striking, where the recent species comprehended under certain genera do greatly outnumber the fossils. Thus, under the Linnean genus Cònus are comprised 155 species existing; but only 3 occur fossil in our London clay. The genus Cypræ̀a contains about 110 living species, and only 4 fossil in the tertiary beds.

Thus, during the revolutions of ages, some races have been extinguished, and have given place to others which may still be traced in our seas. In the great tertiary deposits of the Sub-Apennines, Brocchi conceived he could point out some marine shells, which are now very widely dispersed, in the

Indian and American Oceans, the Atlantic, the Red Sea, the Persian Gulf, and the coasts of Africa and Jamaica.

The fresh-water formation of the Isle of Wight contains a species of Phasianélla, whose recent analogue inhabits the shores of islands in the neighbourhood of New Holland. Another fossil (*Mỳa* gregària), from the same place, is similar to a fresh-water shell now inhabiting the Rio de la Plata; and the Potámides of the same beds are found recent in the fresh-waters of the Islands of Bourbon, Guadaloupe, Madagascar, and the river Congo. Another, resembling the Vóluta Lambérti of the crag, occurs as a rare shell on the shores of the Fejee Islands in the South Seas. (*Sowerby.*)

The circumstances under which the testaceous remains were accumulated, in different formations, are various. They appear to have been subjected to the tumultuous action of water, in the great oolite, where they commonly occur in a comminuted state, and in the coral rag they consist chiefly of fragments. In some of the formations they were evidently deposited by tranquil waters, and have remained without disturbance. This is apparent in the chalk, the London clay, and, indeed, in almost all the clay strata. London clay is decidedly the most rich in beautifully preserved fossils; the crag, the fresh-water strata, and the upper green sand are almost equally prolific. *

Mr. G. B. Sowerby, in an article in the *Annals of Philosophy*, October, 1821, points out the means of distinguishing between fossil fresh-water and marine shells, independently of their animal inhabitants. Our Magazine (Vol. I. p. 425. to 428.) contains several plates of recent fresh-water shells.

Of all the genera of fossil shells, Terebrátulæ and Ammonites have the widest range, and possess the greatest number of individuals. The Geological Society of London possess a series of Ammonites from India, which are objects of adoration or worship among the Hindoos. They are found on the south-west side of the Himalah mountains, and fall from a height beyond the reach of man, and above the limit of perpetual snow. They are only thus obtained by the natives, and then are religiously preserved; so that Europeans seldom know of them, on account of the Ammonites being carefully concealed from their knowledge. There are probably more than one species of sacred Ammonites in this collection.

Belemnites are included in the foregoing list of multilocular shells, but their forms are too singular to be passed without separate notice. The structure of these animals has been subjected to the examination of Messrs. Parkinson, T. Allan, and Miller, and, lastly, of M. de Blainville, in his memoir on Cephalopodous Mollúsca.

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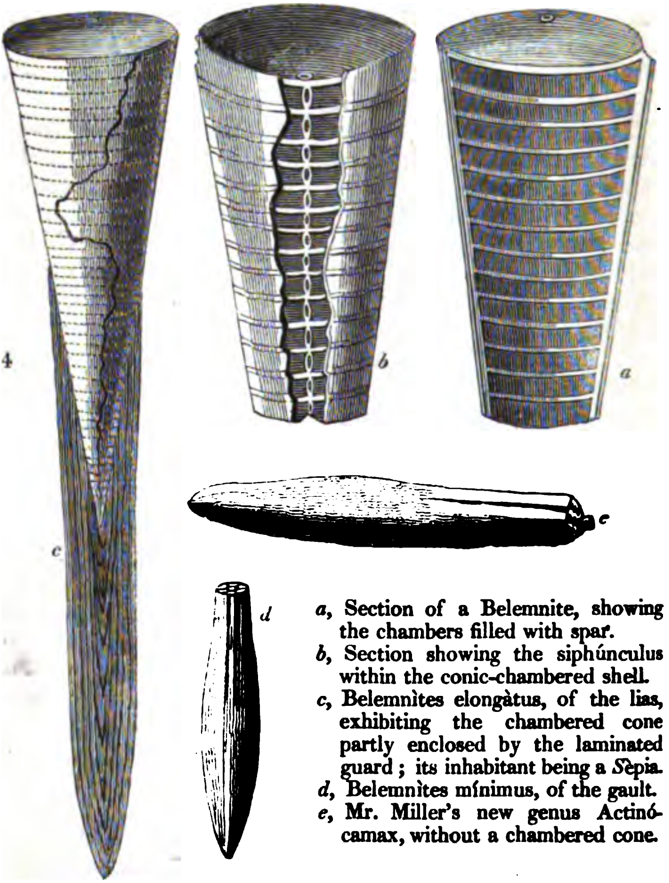
* See in Mr. J. Phillips's *Geology of Yorkshire*, his notes on the conservation and distribution of organic remains.

Illustrations of Mr. Miller's article on Belemnites, in the *Transactions of the Geological Society*, New Series, vol. ii. pl. 7, 8, and 9.



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- *a*, Section of a Belemnite, showing the chambers filled with spar.
- *b*, Section showing the siphúnculus within the conic-chambered shell.
- *c*, Belemnìtes elongàtus, of the lias, exhibiting the chambered cone partly enclosed by the laminated guard; its inhabitant being a *Sèpia.*
- *d*, Belemnìtes mínimus, of the gault.
- *e*, Mr. Miller's new genus Actinócamax, without a chambered cone.

These bodies are determined to be concamerated shells, intermediate between the bony *Sèpia* and the shelly *Naútilus.* They are found in almost all the formations from the lias to the chalk, but not in the slate formation, or in mountain limestone; neither have they been found in the beds above the chalk. In the first case (the slate and mountain limestone), M. de Blainville conceives their places were supplied by the

Orthoceratites; and, in the second, by the Belópteræ. Their geological situation, on this authority, is as follows: —

Lias and inferior oolite	2 species.	Gault	1 species.
Lias and Oxford clay	1	Chalk	8
Lias only	6	Doubtful	11
Inferior oolite	8		—
Stonesfield slate	1		50
Oolites	12		—

"I have not dared," this author remarks, "to state that the secondary formations are each characterised by a division, or even by a particular species, of Belemnites, but that is probable." The examination of these species has led to the following results: —That the larger their cavities are, the nearer they approach to the true Orthóceræ; and the more they are adherent to the rock which contains them, the more ancient are they. As they recede in antiquity their structure becomes more crystalline; but, as they approach the recent strata, this structure, on the contrary, becomes more fibrous. (*fig.* 74.)

The author proceeds to notice some other genera of fossil bodies which possess characters and properties allied to Belemnites and Sepias. The entire gradation of this class, ascending to the *Naútili*, may be thus briefly stated: —

Genera.	Sp.	Description.
Actinócamax (a doubtful genus)	1	Without a cavity. A. vèrus, of the chalk.
Belemnites	49	With a multilocular shell. See *Min. Conch.*
Belóptera	3	With a multilocular shell. Between the Belemnìtes and the *Sèpia*, but approaching nearest to the latter: analogous to the posterior part of the bone of the *Sèpia*.
Pseudóbelus	3	With a multilocular shell, but without a cavity. Found in chlorite chalk and lower oolite.
Rhyncólithes	sev.	Without a cavity. All belonging to ancient formations.
Conchorhýnchus		Approaching to *Sèpia*, but resembling the beak of a bivalve shell: perhaps a genus nearest to Terebrátulæ.
Sèpia		In the limestone of Pappenheim, absolutely resembling those with which we are acquainted at the present day; also in the lias of Twiverton and Keynsham, near Bristol.
Orthoceratites, Nautilites, &c.		

ARTICULATED ANIMALS.

Crustàcea. — Crabs and lobsters, in a mineralised state, have been obtained, sparingly, from several of the formations: commencing with the lias, abundant in the London clay, and almost unaltered in the crag.

Ástacus.—This genus is more extensively distributed than that of Cáncer. We can only at present arrange them, without distinguishing species, as follows: —

In the lias, 2 species; inferior oolite, 1; Stonesfield slate, Kelloways rock, Oxford clay, 1; coral rag, 2; gault and Speeton clay, 2; upper green sand, 1; chalk, 2; London clay, 1 or 2; crag, 1.

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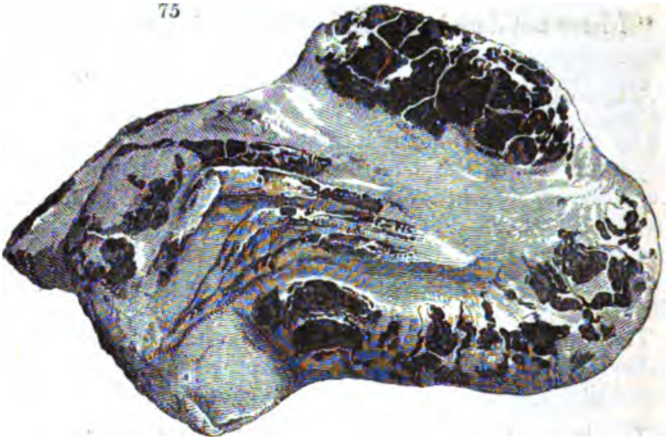

Lobster from Sheppy. Whether the figure named by the author of *Icones Fossilium Séctiles* as *Cáncer* tuberculàtus, fig. 54., from the same locality, is similar to this specimen, cannot be determined, on account of the extreme coarseness of his plate.

Cáncer.—Some varieties are stated to occur in the Stonesfield slàte; in the gault, 4 species; chalk, 2 species; London clay, 3 or 4 species; perhaps in the inferior oolite, 2.

These genera, particularly the crabs, are found in great numbers, although rarely perfect, upon the beach beneath the Sheppy clay cliffs. None of the fossil Crustàcea have been ascertained to be identical with existing species. We possess no complete English work on the fossil Crustàcea; but refer, for further illustration of this branch of natural history, to the *Histoire Naturelle des Crustaces Fossiles*, par M. Desmarest.

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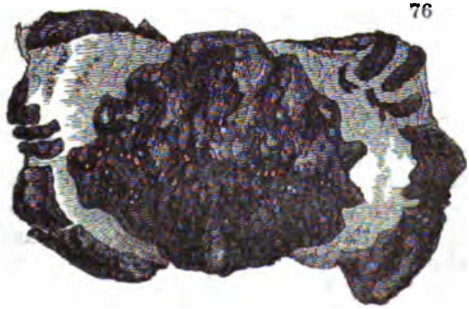

Crab from Sheppy. Probably not the same as Cáncer Leách*ii* of Desmarest, pl. viii. fig. 5, 6.

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Under side of a crab from Sheppy; obscure.

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I'nachus Lamárck*ii*, also from Sheppy; locally called sea spider. Agrees with Desmarest's fig. 15. pl. ix.

A crustaceous animal, of the size of a large shrimp, has been observed, in a cast, amongst teeth and bones of fishes, in the crag. Another, somewhat smaller than a shrimp, is mentioned, in the ferruginous sandstone of Atherfield, Isle of Wight. The minute animal, figured as a bivalve in *Mineral Conchology* under the name of Cy̆pris fàba, abounding in the lamina of the Weald clay, has been recently affirmed to be a crustaceous insect. Cirrípedes, or Barnacles, are now considered by Dr. Thompson to belong to the class Crustàcea.

Mr. Parkinson figures a small crustaceous animal, which is frequently found with the Trilobite in the Dudley limestone. (*Org. Rem.*, vol. iii. pl. 17. fig. 19.)

Trilobites, which are now properly arranged with the Crustàcea, are of several species, but their living analogues are unknown. Mr. Weaver remarks, that one tuberculated trilobite seems characteristic of the limestone and slate clay of the carboniferous series; occurring also in the Mendip Hills, Caldy Island, Bristol, and Cork; in the Isles of Man and Anglesea, and Holy Island; in Kendal and Dumfriesshire. A larger species occurs in the transition slate of France.

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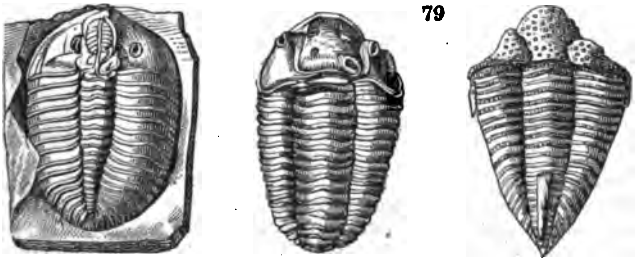


a, Calymène variolàris, from Dudley limestone. b, Calymène Blumenbàch*ii*, from Dudley. c, A'saphus Debùch*ii*, from Dynevoı Park, South Wales.

On the subject of Trilobites M. A. Brongniart's *Histoire Naturelle des Trilobites* may be consulted.

Several figures of Trilobites, from the Dudley and Barr limestones with Mr. J. D. C. Sowerby's remarks, have appeared in this work (Vol. II. p. 41.). continued p. 361. R. C. T

PART II.

REVIEWS.

ART. I. *Flòra Devoniénsis: or a Descriptive Catalogue of Plants growing wild in the County of Devon, arranged both according to the Linnean and Natural Systems, with an Account of their Geographical Distribution, &c.* By the Rev. J. P. Jones and J. F. Kingston. London. 8vo. 16*s.*

LOCAL *Floras* are exceedingly useful both to the novice in science and the professed botanist. They confine the observation of the inexperienced within a limited district, and lessen the number of his particulars; they lead him to an acquaintance with certain species, by directing him to their localities in his neighbourhood, while the authors generally become the referees to clear up such obscure points as require elucidation. To the practised botanist they are still more important: they furnish him with materials for determining the conditions required for particular plants, and supply him also, in some measure, with the negative as well as the positive list of the district.

The authors of the present work, instead of making botany a mere study of hard names, have very properly appended some general observations on vegetable distribution. We are sorry they are so meagre; and that, with the views they profess to entertain, so large a portion of the volume should be filled with technical matter; as, in the present day, a local *Flora* ought not to be confined to the hackneyed description of species which is to be found in every general work, but should be distinguished by such research as carries the subject forward; and especially those particulars should be noticed which are presented to advantage in a limited district.

The county of Devon is very favourable for such an undertaking: it offers to the botanist a great variety of soil; and some extensive and well marked strata. It comprehends a granite district, including Dartmoor, which will yield him a rich harvest of *cryptogamic* plants; a slate district of various degrees of fertility; transition limestone, less luxuriant; red sandstone, uniformly fertile; besides a long tract of coast, both on the north and south, where some of the greatest rarities of the kingdom are to be found. The authors observe, "With all this variety in the rock strata, we know of no peculiar vegetable features by which to distinguish one formation from another: the *Císteæ*, *Conỳza* squarròsa, and one or two other plants, seem to affect the limestone; the *Clématis*, also, appears to grow more luxuriantly among the crevices of that rock than elsewhere; whilst the *I*ris fœtidíssima and the elm prevail most in the red sandstone. Still, neither these, nor any other species, so far as we are aware, are exclusively confined to any particular formation." We entertain, ourselves, a hope that accurate observation will detect many vegetable attachments, few of which, probably, will be found exclusive; but the like conditions being given of moisture, temperature, sunshine, shade, and other elements, then we may expect to find plants making an election of soil or stratum, so as to obtain them in the degree suited to their nature.

We regret that the authors should have been compelled to leave to the future a closer examination of the northern portion of the county, as they will find it well worth a minute investigation. Their suspicions that the

Scírpus Holoschœ̀nus is lost from Braunton Burrows is unfounded, as we have abundance of specimens from that spot, gathered three or four years ago. They will also find *Teùcrium Scórdium* in a very peculiar situation, growing in wet sand, whereas it is usually a fen plant.

As we delight in local *Floras*, we should be very ungrateful to quarrel with authors who have indulged our fancy; yet we doubt the expediency of making their work so bulky and expensive, and should have been better satisfied if they had given us a list of species with their localities, and such new information as their diligence had enabled them to collect, and had not repeated twice over the generic and specific characters of the flowering plants for the sake of presenting the reader with both the Linnean and natural arrangement. A list of genera would have answered every purpose. One of the chief objects at which scientific writers should aim, is to make science cheap and accessible to all. We wish, too, that the authors had consulted the latest authorities on their subject; but we do not observe a single reference to Sir James Smith's *English Flora*, a work of indisputable merit, and on the question of species of the first authority. If his new views had been rejected, after due examination, we should have no right to complain, but they ought not to have been overlooked. The cryptogamic part is done with more care.

After all, the work before us will be found useful to such persons as are residents within the county, and to those who are induced to visit "Devon's myrtle vales," from curiosity, or in search of the inestimable blessing of health. The faults are not such as are of great importance to the learner; and the experienced botanist will have access to more general works to supply the deficiencies. — ☞

ART. II. *Literary Notices.*

LINDLEY and Hutton's Fossil Flora of Great Britain. — I rejoice to see a Fossil Flora announced by two such scientific gentlemen as Professor Lindley and Mr. Hutton. The well known botanic accuracy of the former will distinguish by the few remaining characters the fossils possess, whether their complete identity yet exists or not. This is a work which the mere English botanist would be incompetent to grapple with; for the entire Flora of the older formations consists in scitamineous plants, ferns, and palms, cacti, &c., the resemblances of which at present are only found within the tropics, although every coal measure in Europe abounds with similar specimens. The nearest resemblance to the present vegetables of England exists in the more recent formation of the London clay. In this stratum, at least, races of plants *similar* to those of Europe and North America are abundant, which is sufficiently obvious in glancing over the acorns and nuts that have been so plentifully procured from the Isle of Sheppy; yet even here some tropical remains are found, although more scantily. In the fossils of Colebrook Dale, syngenesious plants, mixed with the grasses, appear to be particularly abundant. The union of Mr. Hutton, of geological repute, with Mr. Lindley is a happy circumstance, and, I doubt not, a work of great utility to future geological enquiries will be the result. I trust that it will be published consecutively, beginning either with the more recent or primitive assemblages, a method that will immediately render the very first part of general utility; a plan much more readily accomplished in *fossil* than in *recent* botany. — *W. Masters. Canterbury, January,* 1830.

A Geological Flora of Europe is in contemplation by some French and German botanists, in which the plants will be classed according to the rocks and soils believed to be most congenial to them.—*B. Paris, March* 1830.

PART III.

MISCELLANEOUS INTELLIGENCE.

ART. I. *Foreign Notices.*

FRANCE.

Two Poodles from Milan. — Sir, Two very remarkable savans now divide the attention of the French public with the romantic tragedy of Hernani by Victor Hugo, and I transmit to you a description of them which I received a few days ago: —

"They are poodles from Milan, where they have received their education; the elder, named Fido, is white, with some black patches on his head and back, and the younger, who is called Bianco, is also white, but with red spots. Fido is a grave and serious personage, walks with dignity round the circle assembled to see him, and appears much absorbed in reflection. Bianco is young and giddy, but full of talent when he chooses to apply it. Owing to his more sedate disposition, Fido, however, is called upon to act the principal part of the exhibition: a word is dictated to him from the Greek, Latin, Italian, German, French, or English language, and selected from a vocabulary where fifty words in each tongue are inscribed, and which altogether make three hundred different combinations. An alphabet is placed before Fido, and from it he takes the letters which compose the given word, and lays them in their proper order at the feet of his master. On one occasion he was told to spell the word Heaven, and he quickly placed the letters till he came to the second e, he stood for an instant as if puzzled, but in a moment after he took the e out of the first syllable, and put it into the second. His attainments in orthography, however, are not so surprising as those in arithmetic; he practises the four rules with extraordinary facility, arranges the double ciphers as he did the double vowels in the word heaven, and rarely makes an error. When such does occur, his more thoughtless companion is called in to rectify it, which he invariably does with the greatest quickness, but as he had rather play than work, and pulls Fido by the ears to make him as idle as himself, he is quickly dismissed. One day the steady Fido spelt the word Jupiter with a b, instead of a p, after the manner of the Germans; Bianco was summoned to his aid, who, after contemplating the word, pushed out the b with his nose, and seizing a p between his teeth, put it into the vacancy. Fido is remarkable for the modest firmness with which he insists upon his correctness when he feels convinced of it himself; for a lady having struck a repeating watch in his ear, he selected an 8 for the hour, and a 6 for the three quarters. The company present, and his master, called out to him he was wrong; he reviewed his numbers, and stood still, his master insisted, and he again examined his ciphers, after which he went quietly, but not in the least abashed, into the middle of the carpet, and looked at his audience; the watch was then sounded again, and it was found to have struck two at every quarter, and Fido received the plaudits which followed with as gentle a demeanour as he had borne the accusation of error.

"One occupation seems to bring the giddy Bianco to the gravity of the elder savant, and when the spectators are tired of arithmetic and orthography, the two dogs either sit down with each other to écarté, or become the antagonists of one of the company. They ask for, or refuse cards, as their hands require, with a most important look, they cut at the proper times, and never mistake one suit for another. They have recourse to their ciphers to mark their points, and on one occasion Bianco having won, he selected his number, and on being asked what were the gains of his adversary, he immediately took an 0 between his teeth, and showed it to the querist; and both seem to know all the turns of the game as thoroughly as the most experienced card-players.

" All this passes without the slightest visible or audible sign between the poodles and their master, the spectators are placed within three steps of the carpet on which the performance goes forward; people have gone for the sole purpose of watching the master, every body visits them, and yet no one has yet found out the mode of communication established between them and their owner. Whatever this communication may be, it does not deduct from the wonderful intelligence of these animals; for there must be a multiplicity of signs not only to be understood with eyes or ears, but to be separated from each other in their minds, or to be combined one with another, for the various trials in which they are exercised.

" I have seen learned pigs and ponies, and can, after these spectacles, readily imagine how the extraordinary sagacity of a dog may be brought to a knowledge of the orthography of three hundred words; but I must confess myself puzzled by the acquirements of these poodles in arithmetic, which must depend upon the will of the spectator who proposes the numbers; but that which is most surprising of all is the skill with which they play écarté. The gravity and attention with which they carry on their game is almost ludicrous, and the satisfaction of Bianco when he marks his points is perfectly evident.

" I must not omit a very amiable feature in the character of these four-footed savans, which is, that their great superiority of instruction over their brethren has not in the least destroyed their more engaging qualities. Not only are they obedient, but lively, affectionate, and gentle, and have not one particle of conceit, though all Paris sees and admires them."

I can vouch for the entire veracity of the above statement, and am, Sir, yours, &c. — *Sarah Lee.* 27. *Burton Street, Burton Crescent, March,* 1830.

ITALY.

Volcano of Pietra Mala. — In crossing the Apennines we slept at the village of Pietra Mala, about half way between Bologna and Florence, that we might more conveniently see the celebrated volcano, which is about a mile from the village, and to which, attended by a guide, we bent our steps soon after it was dark. As usual we found the account in our guide-book incorrect. Far from illuminating the surrounding mountains, we should not, until quite near it, have taken it for any thing but a candle in a cottage window, or at most a small bonfire; and instead of presenting the extraordinary peculiarity of lighting wood but not heating stones, we found those which lie upon it so hot as not to be held in the hand, and the heat sufficient to roast, very speedily, some chestnuts which my sons chanced to have in their pockets, and which they ate with double glee on account of their cookery at this natural furnace, which has been burning for ages, and which from this circumstance derives its greatest interest. Strictly it has little claim to be called a volcano, there not being the slightest appearance of any crater. It is merely a flame of hydrogen or carburetted hydrogen gas, issuing from crevices in an oval space 6 ft. or 8 ft. long, by 3 ft. or 4 ft. broad, on the same level with the surrounding field, and which space is covered to the height of about a foot with small pieces of indurated clay, or clay slate of a red colour, but in such small quantity, that it seems more probable that they have been purposely thrown there than elevated from below. The flame breaks out here and there from among the stones, to the height of about a foot, the whole having much the appearance of a fire of wood, spread about, on which stones or brick bats had been thrown, whence probably the Italian name for it, *Fuoco di Legno*. Our guide, being a mere boy, could give us no information as to whether the flame is ever extinguished, which one would think might happen from the extremely heavy rains and high winds that occur among the Apennines; whether, as the guide-book asserts, it is more vivid in wet weather, &c. &c.; and I have not had an opportunity of consulting modern Italian works on these and other points, as the precise chemical composition of the gas, which has doubtless been examined and determined.

Having satisfied our curiosity as far as practicable, we returned to the village by the wretched road we had previously traversed, the state of which, and of the inn, are striking proofs of Italian apathy. This so called volcano has been famous for upwards of 250 years, Montaigne, in his interesting *Travels in Italy*, in 1580, mentioning his great regret that he had not stopped to examine it; and if the road were good, which it might be made at an expense of less than 50*l*., and the accommodations at the inn ample, scarcely a traveller would cross the Apennines who would not sleep there, in order to visit this remarkable phenomenon. Instead of which, the road is so wretchedly bad, first through a dirty lane, and then over rocks and across ploughed fields, as to be almost impracticable after rain for females; and the inn, though improved since Forsyth described it in such dark colours, is still very indifferent, and the charges exorbitant, so that a great proportion of travellers give up seeing the volcano, and sleep at Coviliajo, a better inn, a few miles farther on. How differently would these things be managed in England or Germany! where, in passing from Bavaria to the Tyrol, we found an excellent gravel walk, purposely made to lead to a cascade some hundred yards from the high road, though not near any inn or village, and no one claimed any thing for the accommodation. — *W. S. Florence, January* 2. 1830.

Art. II. *Natural History in London.*

Zoological Society. — A somewhat noisy Meeting of this Society took place on April 1., at the Society's house. Lord Auckland was in the chair. The chief subject of dispute was the continuance of Mr. Sabine ex-Secretary of the Horticultural Society, as superintendant of the Zoological Farm. Mr. Sabine was warmly defended by Lord Auckland and Lord Carnarvon, and attacked with equal warmth by Messrs. Burke, Ker, Chambers, and others. There are few things more remarkable in the Meetings of bodies entirely dependent on their popularity for existence, than the strenuous efforts which the leaders almost invariably make in the defence of any individual who happens to be accidentally connected with them. Of Mr. Sabine's cattle-feeding capabilities, of course, we do not pretend to judge; but when it is on record that his ignorance and extravagance have already brought one Society to the brink of ruin, can any thing be conceived more strange than that men of common sense should insist on his being allowed an opportunity of doing the same by another, *because he has not been convicted of any thing fraudulent?* Did the fact of Mr. Sabine's being an honest man, — which Lord Auckland seemed to think quite conclusive of that gentleman's merits, — in any respect diminish the load of debt which his conduct has entailed on the Horticultural Society? There was another point which was endeavoured to be made a great deal of, and which is in every respect as unsound. Mr. Sabine, it seems, gives his superintendence gratuitously. The only consequence we ever knew to result from that species of service was, that it made those who received it the thralls of those who gave it; that it destroyed all responsibility in the servant, and all claim to supervision in the master. If the Society engage an active respectable man to do their business — which they may do for one hundred and fifty, or two hundred pounds a year, — they will have one whom a sense of interest will render attentive and obedient, whom they may correct when he goes wrong, and discharge if he will not be corrected. At present they save this mighty sum by employing a man who will attend to his honorary duties when he likes, and how he likes; whose conduct, whether right or wrong, they dare not challenge; and of whose disservice they will soon find it next to impossible to rid themselves. There is indeed a remedy to this species of folly, which never fails of effect, — the subscribers can withdraw. *And they will do so.* The Medico-Botanical, the Horticultural, the Zoological, will probably continue to exhibit their princes, their pines, and their parrots, for some time longer; but the impulse which put their machinery in motion has ceased, and the friction is every hour increasing. In a year or two more they may expect to encounter the fate to which folly and favouritism, when not supported by statute, are ever subjected, and to add to the long list of useful projects which wisdom has begun and mismanagement ended. (*Spectator*, April 3.)

To the above very judicious observations, we shall only add, that nothing can show the consummate vanity of Mr. Sabine more than the fact of his continuing to obtrude his services both on the Zoological Society, and to a certain extent on the Horticultural; certain parts and things in the Chiswick Garden being still under his care. Mr. Sabine's friends and enemies, we believe, alike wish him to retire altogether from both these Societies, and the former have done every thing short of telling him so to his face. If Mr. Sabine really wishes well to these Societies, he ought to sacrifice his own feelings to public opinion, and back out of them, as the phrase is, with all possible speed. He may rely upon this, that his espionnage system (monstrous, as Mr. Lindley well termed it), as given in evidence to the Committee of the Horticultural Society, published in part in the last number (xxv.) of the *Gardener's Magazine*, has rendered his name loathsome, not merely to every gardener or naturalist, but to every man with the feelings of an Englishman, to every man, in short, of common honour and honesty. It is right that such practices should be exposed, in order that they may excite universal execration, and thus tend to prevent their recurrence. — *Cond.*

Contributions to the Menagery. The taste for zoological science has so much extended in the country within the last few years, that there is every reason to hope that we shall very shortly have no cause to complain of inferiority to our neighbours in this department of natural history. That the establishment of the Zoological Society has very much contributed to increase and diffuse this taste, no one can doubt; and, considering the short time that Society has been established, it is astonishing what advances have been made both in the formation of a museum and menagery. The latter contains specimens of the most valuable kind, but is still very deficient in examples from our British Fauna. Notwithstanding the numerous parks in this country, no one has presented them with a pair of deer; and in most of the smaller animals indigenous to this country they are entirely wanting. If the friends of natural history would contribute their efforts to this object, the deficiency would soon be supplied. Those noblemen and gentlemen interested in the institution would confer a great benefit upon it, if they would direct their keepers to send specimens of all kinds of vermin (as they are called) and birds, alive, to Bruton Street. I would particularly direct their attention to individuals of the *M*ustèla, or weasel tribe; the polecat, marten, ferret, weasel, &c. &c.; also the badger, hare, rabbit, pheasant (especially the ring-necked), partridge, and all kinds of birds from the house sparrow to the hawk. I have not mentioned different varieties of *S*òrex, or shrew mouse, water rat, field mouse, &c. Any contributions would be very valuable, and I know that the Society would willingly pay any expenses incident upon their transmission to Bruton Street.—*F. Z. S. London, April* 15. 1820.

Linnean Society. — *March* 16. On this evening (being the eve of St. Patrick), Mr. Bicheno, the secretary, read a paper on the plant intended by the shamrock of Ireland, in which he attempted to prove by botanical, historical, and etymological evidence, that the original plant was not the white clover, which is now employed as the national emblem. He stated that it would seem a condition at least suitable, if not necessary, to a national emblem, that it should be something familiar to the people, and familiar too at that season when the national feast is celebrated. Thus the Welsh have given the *leek* to St. David, being a favourite oleraceous herb, and the only green thing they could find on the 1st of March. The Scotch, on the other hand, whose feast is in autumn, have adopted the *thistle*. The white clover is not fully expanded on St. Patrick's day, and wild specimens of it could hardly be obtained at this season. Besides it was probably, nay, almost certainly, a plant of uncommon occurrence in Ireland during its early history, having been introduced into that country in the middle of the seventeenth century, and made common by cultivation. He then referred to several old authors, to prove that the *shamrock* was eaten by the Irish; and to one who went over to Ireland in the sixteenth century, who says it was eaten, and was a *sour* plant. The name, also, of shamrock is common to several trefoils, both in the Irish and Gaelic languages. Now clover could not have been eaten, and it is not sour. Taking, therefore, all the conditions requisite, they are only found in the wood-sorrel, *O*'xalis Acetosélla. It is an early spring plant; it was, and is, abundant in Ireland; it is a trefoil; it is called *sham-rog* by the old herbalists, and it is sour: whilst its beauty might well entitle it to the distinction of being the national emblem. The substitution of one for the other has been occasioned by cultivation, which made the wood-sorrel less plentiful, and the Dutch clover abundant. (*Phil. Mag.*, April 1830, p. 228.)

Geological Society. — *Feb.* 19. This being the Anniversary Meeting, an excellent address was delivered from the chair by the president, Professor Sedgewick. The affairs of the Society are in a prosperous condition, and the number of members increasing. During the last year, fifty home and seven foreign members have been added to the list, and several excellent papers have been received and read, the most important of which were noticed by the Professor, in his most eloquent and philosophical discourse. The address, being too long for our pages, will be found at length in the *Philosophical Magazine*, vol. vii. No. 40. for April 1830, p. 289.

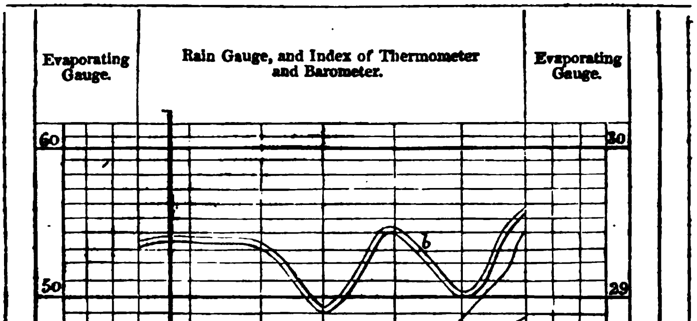
The Meetings of this Society, unlike those of the Linnean, the Zoological, or the Horticultural, are characterised by discussions on the subject of the papers which have been read: this we consider an important feature in favour of this Society, and one which ought to be considered essential in every similar association. Without this kind of discussion and conversation, it seems to us that nine tenths of the good to be done by an assemblage of men devoted to the same pursuits must be lost. Take away the personal intercourse between the members, which takes place before and after the main business of the Meeting, and the rest will appear a species of mummery, often dull enough. But more of this hereafter. — *Cond.*

ART. III. *Calendar of Nature.*

SCOTLAND.

DIAGRAM (*fig.* 80.), showing the Motion of the Mercury in the Barometer and Thermometer, and the Dew Point, or the Mean of each, for every Ten Days in the Months of February and March; also the Mean Temperature of the Air within 6 in. of a South Brick Wall, commencing on the 1st of March, the Thermometer being shaded; and the Depth of Rain in the Pluviometer, and the Quantity of Moisture evaporated in the Evaporating Gauge during the same Period; as extracted from the Register kept at Annat Gardens, Perthshire, N. lat. 56° 23½′, above the level of the sea 172 ft., and 15 miles from the coast, being the mean of daily observations at 10 o'clock morning and 10 o'clock evening.

80



The lines marked *b* show the motion of the mercury in the barometer, *t s w* the mean temperature of the air near a south garden wall, *t* the mean temperature in the open air, and *d* the dew point.

The coldest day in February was the 6th: mean temperature of that day 25°; extreme cold 24°; wind easterly. The warmest day was the 26th: mean temperature of that day 51·5°; extreme heat 56°; wind south-west. There were 5 days of brilliant, and 7 of partial, sunshine; 16 were cloudy.

The wind blew from the east and north-east on 9 days, from the north-west on 3 days, and from the west and south-west on 16 days. Rain or snow fell on 11 days; 17 days were fair. There were loud gales of wind on the 19th from the north; on the 21st from the north-west, accompanied with drifted snow; and on the 26th and 27th from the west, accompanied with rain.

The coldest day in March was the 5th: mean temperature of that day 36·5°; wind east; extreme cold 30°. The warmest day was the 28th: mean temperature of that day 54°; wind west; extreme heat 63°. There were only 5 days of brilliant, and 9 of partial, sunshine; 17 days were cloudy. Rain and snow fell on 11 days; 20 days were fair. The wind blew from the east on 9 days, from the north on 2 days, from the north-west on 3 days, and from the west on 17 days. There were loud gales of wind from the north on the 11th; and from the west on the 12th, 14th, 18th, 19th, 20th, and 29th.

The mean temperature for the month of February being as low as 37·1°, vegetation made very little progress. The winter aconite (*H*ellébo*rus* hyemàlis) was in flower on the 12th; snowdrops appeared above ground on the 13th, and flowered on the 20th. The field lark was first heard to sing on the morning of the 15th. Wood pigeons cooing and partridges pairing on the evening of the 16th. The mavis and blackbird commenced whistling on the morning of the 24th, when the temperature was 44°. At the beginning of March, vegetation was about 10 days later than on an average of years; and the temperature continued low during the first 10 days. The *Cr*òcus vérnus, which, in ordinary seasons, blows about the last week in February, did not this year come in flower before the 9th of March; from that period the temperature became unusually high, as will be seen by the diagram; the consequence was a sudden appearance of spring flowers, which had been retarded by the preceding protracted low temperature. Revet wheat, that was sown on the 26th of January, only appeared above ground on the 14th of March, a period of 47 days; mean temperature of that period 38·3° The *S*axífraga oppositifòlia flowered on the 14th, 6 days earlier than last season, and 10 days later than in 1828. The *Dr*àba *a*ïzoìdes flowered on the 16th; apricot trees on south walls were in full blow by the 23d; *N*arcíssus mìnor on the 24th; Erythrònium Dens cànis on the 25th; gooseberries were in leaf by the 26th; the Pulmonària paniculàta was in flower on the 27th; larch trees were coming in flower by the 28th, on which day the mercury in the thermometer rose to 63°, and fell to 25° on the last hour of the month. — *A. G.* *April* 1. 1830.

ART. IV. *Retrospective Criticism.*

THE Goatsucker's Foot-comb. — It frequently happens that the most ingenious and apparently incontrovertible reasoning in natural history is overturned or confirmed by facts accidentally observed. I was, I confess, disposed to think Mr. Dillon's account of the goatsucker (p. 31.) more plausible than true, and to agree with White and the learned arguments of S. W., till I met with the following passage in Wilson's *American Ornithology*, vol. vi. p. 97., respecting his *C*aprimúlgus carolinénsis: — "Their mouths," he says, "are capable of prodigious expansion, to seize with more certainty, and furnished with long hairs, or bristles, serving as palisades to secure what comes between them. Reposing much during the heats of the day, they are much infested with vermin [Nirmi? Ornithomyiæ?], particularly about the head, and are provided with a comb on the inner edge of the middle claw, with which they are often employed in ridding themselves of these pests, at least when in a state of captivity." This, I think, will set the question at rest. It will only remain for S. W. to show that the Australian group, which want the combed claw, are not infested with Nirmi, &c., and that the Herons either are so, or that their comb is used for some other purpose. — *J. Rennie.* *Lee, Kent, April* 5.

THE MAGAZINE

OF

NATURAL HISTORY.

JULY, 1830.

Art. I. *Remarks on some of the Advantages and Disadvantages of Periodical Works on Natural History.* By a Purchaser of Periodicals.

Sir,

As your Magazine opens a wide field for free discussion and enquiry, and affords not only room but a *place* for almost any subject connected with natural history, I may, perhaps, be allowed to offer, through the medium of your pages, a few remarks on some of the advantages and disadvantages attendant on works which come out in periodical numbers, confining myself, however, to such as relate to natural history. Of such works there is now no lack: we have Floras and Faunas, Magazines, Miscellanies, Registers, Cabinets, Monographs, and Enumerations, in abundance, together with Illustrations, zoological, entomological, and ornithological, besides a formidable phalanx (formidable, I mean, to the *pockets* of the purchasers) of Transactions, the result of the joint wisdom and abilities of those learned bodies, our scientific societies. I do not complain of the number of these publications; on the contrary, I wish to see it increase; for, as it is morally impossible for a man of moderate private fortune to purchase any thing like *all* of them, it is desirable that there should be an ample supply, out of which to make a judicious selection. Of the sort of works in question, I have been, or still am, a purchaser, for my sphere, of a considerable number. I "take them in," as it is called. I have, therefore, some right to speak, from experience, of the advantages and disadvantages of the system. In stating what I have to offer, I am actuated by two motives: first, I would wish to recommend and encourage periodicals on natural history, as being a highly useful, convenient, and agreeable mode of publication; and, secondly, to see the evils and abuses with which they are sometimes attended, and to which they are always more or less liable, as far as possible removed.

It is to be regretted, as being, however, an almost unavoidable evil, that works on natural history are, for the most part, necessarily expensive, especially if they contain plates; still more, if the plates are coloured, as, in many cases, they must be, fully to answer the purpose intended; and, most of all, if these are really well executed, and the work splendidly got up. The cost, for example, of such a work as Sowerby's *English Botany* (not to take one of larger calibre), extending as it did to six and thirty good-sized volumes, though published at a moderate price, would amount (I speak at a rough guess) to, perhaps, near *50l.* or more. Now, this may be thought a serious sum to pay for a favourite hobby, for the mere gratification of one's taste; and many of those who took the work in would have been deterred, I suspect, from purchasing it, had the money been to be paid down for it in a lump. But, as it came out in monthly numbers, and occupied a course of years in its completion, we some of us now find our libraries enriched with a costly and truly valuable book, which, had it been published all at once, we might hardly have thought ourselves justified in purchasing. It will be said, perhaps, in reply, that this way of representing things is mere self-delusion, invented for the sole purpose of quieting the consciences of those who choose to indulge in such elegant and expensive luxuries; for that the same identical sum of money, to a penny, is paid for the article, whether it be taken in *seriatim* or bought complete. No doubt, the same sum *is* paid; but, being paid gradually, and by small instalments, distributed, as it were, through a course of many years, the tax falls lightly, and is scarcely felt. This, then, is one of the advantages of publishing works in the form of periodical numbers: it brings them within the reach of men of moderate means; and, therefore, extends their circulation, and, consequently, their utility.

Another advantage of this method is, that it gives opportunity, not only for correcting any mistakes which the author may have inadvertently fallen into at the commencement of his labours, but also for including in the work all the recent discoveries, which are continually being made during the progress of publication, and thus renders the Flora or Fauna, &c., far more complete than it could have been, had the whole issued simultaneously from the press. Take, again, as an example in point, the case of *English Botany*, the first volume of which bears, in the titlepage, the date of 1790, and the last that of 1814. That very many additions were made to our British Flora during these twenty-four years, it is quite unnecessary to point out. (In the sister department of entomology, the new discoveries, during the same space of time, must have been far more numerous.) The botanical mine is still inexhausted, as new plants are constantly being added to our indigenous list; and these accessions, since the period of 1814, are now found to be sufficient in number to form a supplement to the above work, which, every British botanist must rejoice to know, has already been commenced.

The last advantage I shall mention, as attending the periodical mode of publication, is, that it enhances, if I mistake not, the pleasure which the purchaser derives from the work he takes in, and serves to keep up his interest in it. Count Rumford is said to have recommended, in some cases, the use of tough meat in preference to tender, on the ground that it *prolonged the pleasure of eating*. Without going the length which the philosopher did in this instance, I certainly think the quantum of enjoyment we experience from the sort of works now under consideration, is greatly increased by their being dealt out to us piecemeal, and at intervals. Few persons like to have the whole of their dinner, fish, meat, and pudding, heaped on their plate at once; nor do I, for my part, like to see, on a journey, ten or twenty miles of road before me, in a uniform, monotonous, straight line, as Mr. Telford would have us. These things are somewhat appalling; and, in the one case, would be enough to take away one's appetite, and in the other to damp one's ardour for travelling — for travelling, at least, for pleasure. Six and thirty volumes (to have recourse again to *English Botany* for an example) coming upon one in a body would, perhaps, be equally overpowering; the mind would be bewildered, and at a loss almost to decide what portions of the work to examine first; and certainly the whole has much better chance of being perused and thoroughly digested, when presented to us at stated intervals, in the form of periodical numbers. Then, too, there is the pleasure of *anticipation:* there is something exceedingly agreeable in looking forward to the first of the month for the arrival of a new fasciculus of *Flora* ——, or *Illustrations of* ——, or the next Number, Mr. Editor, of your Magazine. A high degree of interest is excited by speculating what new or curious subjects will next be introduced to us, or what old acquaintances we may expect to meet with, correctly described and figured, and illustrated, perhaps, with much additional information.

Such, as it appears to me, are among the advantages of the plan I speak of. Having shown the bright side of the case, we must now do justice, and, turning the picture, look to the disadvantages. But, first, I must mention a circumstance attendant on some, though not on all, periodical works, of which I stand in doubt, whether it ought more properly to be referred to the side of advantages or the contrary, as it will be found to belong either to the one or the other, exactly as the case may be. I mean, that some of our periodicals actually remind one of a *tape worm*, — they seem to be absolutely interminable! For example, no conceivable period, short of domesday, can be calculated upon for the probable termination of such works as the *Botanical Magazine* and *Botanical Register*, comprehending, as they do, within their capacious range, plants from every region of the known world. So long, indeed, as these works keep up their character, and remain under the auspices of men of science and ability, like their present conductors, we have no reason to complain; but should they, at any time, from whatever cause, fall off and degenerate, verifying the ancient dogma, "Omnia in pejus," the sooner they are brought to a conclusion the better. And, no doubt, there is a pleasure in *completing* any thing; in being able to say, "Now this is finished;" — a pleasure which, of course, is not to be attained in the case of a work which is carried on from generation to generation, and extended *ad infinitum*.

The almost total absence, too, of every thing like systematic arrangement which unavoidably takes place in most periodical works, is another inherent quality of a rather (though far less) ambiguous character, possessing, along with its manifold and great disadvantages, something (and but little) to recommend it. By some people, the promiscuous introduction of plants or animals side by side, having no manner of connection with, or affinity to, each other, may be thought to present an agreeable contrast and pleasing variety, like the miscellaneous ingredients of a mere ornamental parterre; while others (and myself among the number) cannot but regret the want of that *lucidus ordo* which the natural, or even the Linnean, arrangement of the subjects would afford. Aristotle's maxim, "Παράλληλα μᾶλλον γνώριμα," is one of general application; and in nothing does it hold good more than in natural history, the species of a genus being best distinguished — their differences and resemblances most apparent — when placed all together in juxtaposition. The book itself, likewise, especially if it be voluminous, is far more convenient for reference when arranged on some regular plan, whether it be a systematic or mere alphabetical arrangement of the genera and species.* To use a common proverb, it would be like "searching for a needle in a pottle of hay," to look for a plant among the fifty-six volumes of the *Botanical Magazine*, were it not for the assistance of the general index, without which the work would be little better than a confused medley of sweets, *rudis indigestaque moles*, possessing, indeed, an abundance of rich and valuable stores, of which, however, we could only, with labour and difficulty, avail ourselves in time of need.

Turn we now to the *positive unmixed* disadvantages of the periodical system. Of these, some are such as *may*, and therefore *ought*, to be avoided; others are inevitable, and therefore must be patiently endured. To the latter class may be referred the risk which the purchaser always incurs of having a work, on which he has expended a large sum, left incomplete on his hands. Many are the instances in point which might be mentioned: instances of works birth-strangled as it were, dying suddenly a premature death, or, at least, stopping short without being finished, and thus reminding one of the Hudibrastic distich,

> "The adventure of the bear and fiddle
> Is sung, but breaks off in the middle."

Perhaps the author himself dies: his work, of course, is discontinued; or, at all events, it falls into other, probably less able, hands. The newly appointed editor, the *wet nurse*, as he may be called, of the publication, is perhaps precluded, by the very nature of the case, from the possibility of giving to the work that character and stamp of excellence which the genuine parent had done, and would have continued to do, almost without an effort. Who can doubt that Dr. Sibthorp's *Flòra Græ̀ca* would have more completely realised the author's plan, had he lived to publish it himself? And yet, it is but justice to say, that, after his death, the materials were intrusted for publication to the care of Sir J. E. Smith, the plates to be executed by Mr. Sowerby; of all others, perhaps, the two most fitting persons that could have been selected for the purpose.

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* Many periodical works on botany, &c., *when once brought to a conclusion*, may be bound up, not in the order of publication, but systematically, according to some scientific arrangement. Having myself had Sowerby's *English Botany* bound up after the Linnean system, I find the work, in this state, far more convenient to refer to; and, consequently, refer to it now ten times, perhaps, for once that I should have done had the subjects remained in the order of publication, and the different species of a genus been laboriously to be sought for as they lay scattered up and down through thirty-six volumes. Such persons as may happen to have a copy in numbers, or in boards, I would strongly recommend to adopt this or some similar plan.

One main object with the Professor was, as I have understood, to illustrate the botany of the classics; but, with the single exception of the occasional synonymes of Dioscorides, nothing of the kind is to be found in the pages hitherto published of this costly and splendid Flora.

Again, it often happens that a work is discontinued because it is not found to answer. Many, I believe, of our finest works on natural history, to the credit of their authors be it spoken, have been undertaken, not so much for the sake, or with the expectation, of making money by them, as from a genuine disinterested love of the subject itself; a subject in perfect unison with the author's own feelings and pursuits. At the same time, it is hardly to be expected, at least not in the generality of cases, that a man should expend his time and labour on a work from which he not only derives no emolument, but by which he is absolutely out of pocket at the year's end. There is, however, a handsome as well as an unhandsome way of discontinuing a work that does not answer: I call it unhandsome to break off abruptly in the beginning or middle of a volume, and thus leaving the purchasers in the lurch, with a forlorn *piece* of a fragment, bearing about the same proportion to the whole original design, as the two or three first courses of bricks and mortar to do the stately edifice of which they form the foundation. I forbear to name instances in point, though I easily could do so. As an example of the *handsome* manner, I may mention the case of Professor Hooker's *Músci Exótici*, the discontinuance of which all lovers of cryptogamic botany must regret. Finding that the undertaking did not meet with sufficient encouragement (he *lost* money by the work), Dr. Hooker candidly stated to the public, that he was, however reluctantly, under the unavoidable necessity of relinquishing it; and accordingly closed the work at the end of the second volume.

I will not lay much stress on the liability to which purchasers are exposed of having imperfect numbers sent to them — numbers accidentally deficient in one or more of the plates, or in the descriptive letterpress; because, if through inattention they suffer these deficiencies to remain unsupplied, the fault is with themselves, and they have no one else to blame; yet there is occasionally not a little difficulty and demur in rectifying these errors, and this difficulty is, no doubt, in itself an evil.

I now proceed to the most painful part of the task I have proposed to myself, namely, to call attention to those disadvantages of the periodical system which *may*, and therefore *ought*, to be avoided. This, I say, is the most painful part of my task; for, as the authors and editors alluded to are, for the most part, naturalists of one class or another, I am sorry, as a brother-naturalist, to be compelled to speak or think unfavourably of any of the fraternity, of whom I would fain wish to be able to entertain the same opinion as good old Izaak Walton did of his brethren of the angle, that they are all "very honest men." Thus far our way has proved tolerably smooth, and we have gone on pretty comfortably, without much jostling and jolting; now the face of the country begins to assume a different appearance, and the journey threatens to be more rough and disagreeable. I shall not be deterred, however, from pursuing my course, in spite of all difficulties and obstructions. The little, mean, paltry tricks, of which some otherwise respectable editors are guilty, must be exposed to view, and held up to merited reprobation. At the commencement of a periodical work, the author usually puts forth a prospectus, in which he states, among other particulars, his plan and object, the nature and probable extent of the work, the number and style of the plates, whether coloured or plain, the usual quantity of letterpress, the stated intervals at which the numbers are to appear, and the price of the work per number. Now, as it is on the faith of such guarantee that the public have to depend, and by which they are in great measure guided in making up their minds whether to take the work or not, the author is bound, in common honesty, strictly to adhere to the engagements which he has thus voluntarily undertaken. If he fails to fulfil the promises he has held out, his prospectus serves only as a decoy-duck to entrap purchasers, and entice the unwary to their loss. I pass over the great irregularity which occasionally takes place in the appointed periods of publication; because this, I am aware, may be owing to circumstances over which the author has little or no control: the printer may be dilatory and unpunctual; or the engraver or colourer overwhelmed with a more than ordinary press of urgent business; or twenty accidents may occur. But when the irregularity is carried to the extent we sometimes see it, the author himself is hardly to be acquitted of all participation in the blame. The reduction of the number of plates in a fasciculus is a more grievous charge. An author engages to give three, four, or six plates (as the case may be), in each number, and at a certain price: after a time, stimulated, perhaps, by the lucre of gain, he thinks fit to make an alteration; and, to put the best face on things, this he does, either *by adding one or more plates, and, at the same time, raising the price of each fasciculus out of due proportion; or else by reducing the number of plates, and in-*

creasing the quantity of letterpress, which is far from being an equivalent. Perhaps he apologises to the public, complaining of a rise in the price of paper, the expense of printing and engraving, and urging that existing circumstances demand the alteration; or, perhaps, he has the *assurance* to attempt to make his purchasers believe, that, so far from having any cause for complaint, they will be even gainers by the change; or perhaps, again, he quietly adopts the alteration without any apology or notice whatever. I could name a person, were I not afraid of subjecting you, Mr. Editor, to an indictment for a libel by publishing the truth — I could name a person who practised the kind of fraud I speak of, in the most barefaced manner ever heard of. I will describe the case, however: it was that of a new edition of a justly celebrated and costly Flora. When the work drew near to a close, the numbers were found to be deficient in one, and sometimes two, plates; and, by this adroit and economical management, the whole was spun out to 70 numbers; whereas, the plates were barely sufficient to make up the complement for 69. There was no reduction, I should observe, in the price of the numbers; no notice was taken of the defalcation; no apology of any kind attempted to be offered. The transaction can be viewed in no other light than as a gross imposition on the public; for, by this artifice, each purchaser was charged above 16*s.* more than he ought, had the editor kept his engagements. Thinking all this might have originated in mistake, I remonstrated with the bookseller in the country, who was at much pains in enquiring into the business, and endeavouring to sift it to the bottom. No redress, however, was to be had; no other alternative but that of submitting to the imposition, or returning the defective numbers to the bookseller, and putting up with an incomplete copy of a work that had cost upwards of 50*l.* One purchaser, I happen to know, not believing it possible that any respectable editor should practise such a fraud, and suspecting that the blame might rest elsewhere, wrote himself to the editor to make his complaint; he, however (the editor), had the decency, if I may so speak, to "suffer judgment to go by default:"—he returned no answer to the letter.

The above, it is to be hoped, is an extraordinary case: one of more frequent occurrence, and still more paltry, inasmuch as the profit to be derived from the imposition is far more trifling in amount, is that of making purchasers of periodical works pay *extra*, and pay *exorbitantly*, for the titlepage and index to each volume. In these days of cheap publications, when one may buy a little volume, almost, of valuable and "entertaining knowledge" for two shillings, the practice I speak of is downright scandalous. Should *you*, Mr. Editor, ever attempt to treat us in this mean, pettifogging, huckster-like manner, you may depend upon it, you shall hear from me on the occasion, if I am in the land of the living; and, if not, beware lest my troubled spirit haunt and torment you. Hitherto, I must do you the justice to say, you have acted in a way the very reverse of that which I complain of; but, in the course of time, as the love of money is apt to increase with the acquisition, there is no knowing but *you* may grow covetous, grasping, and insolent; therefore, I warn you beforehand to continue on your good behaviour. Of this crying abuse I must proceed, even at the risk of being thought tedious, to give a few particular examples. One editor has the effrontery to print, in rather conspicuous characters, on the cover of his *Reg* * * * * * — his work, I mean, for I am not going to name the book — " No. XII. of Volume XIV., price four shillings, coloured; with AN APPENDIX, price one shilling." On receiving my copy, I could find nothing like an *Appendix*, unless it were the titlepage and index, which I am not accustomed to hear called by that name; and it occurred to me that this *appendix* might possibly be, like the postscript of a lady's letter, the most pithy and important part of the whole. Concluding, therefore, that my copy was imperfect, I ordered the bookseller to procure for me the *appendix*. No such thing, however, was forthcoming; and I was informed that the "appendix" meant the titlepage and index, occupying just two pages octavo, price one shilling! Will the editor maintain that he is guilty of no misnomer here; but that he is strictly correct, according to the etymology of the word "appendix," i. e. something *appended* or added on to another? If so, he should be told that "the meaning of a word is what it signifies;" and that the word "appendix" does not, in common English, signify titlepage and index. Another gentleman has the face unblushingly to send forth his titlepage, dedication, preface, list of books referred to, and index, stitched up in a cover by themselves, with all the self-importance of a regular number of the work, price 2*s.* 6*d.*! — half a crown sterling! — more than two thirds of the price of one of your Magazines! Think of that, Mr. Editor! Two shillings and sixpence lawful money of the realm for a plain, unadorned, typographical titlepage, dedication, preface, list of books referred to, and index (*indices* I ought to say, for there are two), the whole comprised in eight pages octavo! Is it enough for these gentlemen to say, "We never *engaged* to give you a titlepage and index without paying for them?" True; they never did: but I ask whether any one purchaser, when he began to take the work, could possibly expect to be *charged* for such things? An author has no occasion to declare beforehand, that a title and index will be given with the work; because they are to be looked for as matters of course, unless a statement is made to the contrary. A book without a title-page would be like a man without a face; and, without an index, it may be compared to a ship without a rudder. But if an author thinks proper to *charge extra* for these common and indispensable necessaries, surely he ought, in fairness, to state as much in the outset (which, however, would be very injudicious); and then we should have but little reason to blame, however we might regret, such conduct: because, if any one chooses to make a bad bargain with his eyes open, and to take in a work on such terms, it is entirely his own fault. It is the sly underhand part of the transaction, and the littleness of it, with which I am disgusted. Nor, again, is it a good defence for these gentlemen to turn round and say, in reply, "*Caveat emptor:* we offer these things at such a price: do as you like about buying them." What, then, are we to go without these necessary appendages, after having paid handsomely for the book? I appeal to any man of common sense and honesty, whether this is fair and honourable dealing? whether such a practice is not calculated to bring the whole race of periodical authors and their works into disrepute? For the honour of naturalists, I do hope that the blame attaches to some bookseller's * * *, or to that other personage, intimately connected with literature, ycleped "the printer's devil," rather than to the respectable persons whose names appear in these costly titlepages. I should be happy to learn that my insinuations are well founded; and I beg of you, Mr. Editor, to have the goodness to request * * * * *

When Claude Lorrain, who, it is well known, was not celebrated for painting figures, disposed of his pictures, he used to say to the purchasers, "I *sell* you the landscape, but, mind, I *give* you the figures." But these gentry I have alluded to would have us pay for their wares, in a manner, *twice over;* we must purchase the numbers, and then pay over and above for the titlepage and index! Observe, I am not complaining of being charged a fair price for a *general index* to a long series of volumes, like those published for the first twenty and forty volumes of the *Botanical Magazine.* Such indices, Mr. Editor, I hope you will publish at the end of every ten or dozen volumes of your miscellany; and, I assure you, I shall be among the first to order them of the bookseller, and to pay the cost with a good grace. What I complain of is, being charged enormously for a plain, printed titlepage and index, without any portrait of the author, without any ornamental vignette, or expensive decorations, but merely the ordinary titlepage and index to the volume; for which (if they *must* be paid for separately) the smallest denomination of the current coin would be a high price; and which, in common fairness, ought to be given to each purchaser (as Dr. South says), "like paper and packthread, into the bargain."

For the edification of all concerned in these petty practices, I will now take leave to relate a very homely anecdote, the moral lesson of which they will do well to apply to themselves. When I was at school, Mr. Editor, we boys used to buy eatables of an old woman whom I believe to have been a very fair dealer. However, schoolboy-like, our pockets, too, being sometimes low, we were always for having a good pennyworth for our money; and often used to jeer this honest old creature, very unjustly, I believe, for not giving us good measure. One day she happened to be weighing out some sausage-meat, when the usual cry was raised, more in jest than earnest, "Mother Parker, that is not weight!—put a little more into the scale." "Don't be afraid," she replied, "you shall have good weight, I warrant you; for I promise you, my lad, I will never go to hell for half a pound of sausages." I have to apologise for the homeliness—the *coarseness*, if you will—and *vulgarity* of this anecdote; yet, I must say, the strong good sense and honest principle evinced by this humble but respectable tradeswoman deserve to be recorded to her honour, and may advantageously be held up as examples for the imitation of some who are her superiors in rank and education. Half a crown or three and sixpence per annum can hardly be a sum of consequence to any one who can afford to indulge in the luxury of a periodical work on natural history. But nobody likes to think himself imposed upon, even to the amount of a farthing. And I speak sincerely when I say, that I really do grieve to see the names of respectable authors and editors — men of taste, science, and education — *naturalists* — associated with such paltry artifices as those which I have endeavoured to expose. For their own credit and character's sake, I would entreat them to abandon such mean conduct: it is calculated to disgust the public, and deter many from giving their support to a most convenient and pleasing class of works, who otherwise might be well disposed to do so.* At the same time I beg to be understood that I do not wish to drive a hard bargain, nor to have an author publish his work at a loss. No; "the labourer is worthy of his hire." Let him, by all means, sit down and calculate beforehand what will be a remunerating return for his labour; at what rate he can afford to sell his numbers; let him, if he pleases, be quite sure to *charge enough*, provided only he does it fairly, openly, and avowedly from the first. Having settled these points with himself, and stated them to the public, together with other particulars, and obtained purchasers upon these express conditions, let him strictly and conscientiously fulfil his engagements. Let there be no attempt to eke out some extra-profit by a reduction in the number of the plates; let there be no afterclaps for such useful but unpretending articles as a title-page and index; no miscalling of them by the more dignified and imposing appellation of an "appendix." Let no respectable author or editor disgrace himself by condescending to be guilty of such mean artifices: but having, as it were, "sworn unto his neighbour," let him see that he keep his promise, "and disappoint him not, even though it were to his own hindrance." I am, Sir, &c.

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* I have been informed, on unquestionable authority, that a certain nobleman of the higher grade, and of princely fortune, to whom money could be only a secondary consideration, having been solicited to take in a

A PURCHASER OF PERIODICALS.

ART. II. *On the Luminousness of the Sea.* Read before the Plinian Society. By W. BAIRD, Esq., Member of that Society.

THE remarkable and beautiful appearance, so frequently seen in the waters of the ocean, and generally known by the name of the "luminousness of the sea," is a phenomenon so interesting and striking, that it could not fail to attract the attention, not only of every man of science who has ever been placed in a situation to see it, but it must have even struck the eye of the most casual observer. We accordingly find that this is the case, and that it has been observed and described by different authors, in various parts of the world. It

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rather expensive periodical work, *of which he approved*, refused to do so, observing, at the same time, that he meant to purchase the work when it was completed. No reason, that I am aware of, was assigned by this nobleman why he would not take in the work by numbers, as it was published; but, very possibly, he might have had his suspicions, owing to the frequent occurrence of such cases, that it might be discontinued, or fall off in merit, &c. &c. And I can assert, of my own knowledge, that there are many persons who have a rooted objection to taking in works by numbers, grounded on the apprehension of being, in some way or other, unhandsomely treated by the respective editors.

is to be seen upon our own shores, and in our own seas; but though we agree with the celebrated Muller, in the beautiful introduction to his *Commentarius de Monoculis*, "Non mutandum cœlum, non trajicienda maria, non petenda et vitæ et pecuniarum dispendio, loca remotissima, ut invisa, ut inaudita inquiramus; ipsa litora vicina, ipsa patria tellus, lacus, stagna, rivi, quid quod vada et quævis palustria domestica, mirandorum feracia existunt." * Still it is in warmer regions and more southernly latitudes, that this phenomenon attains its greatest degree of brilliancy and beauty. In these situations it is impossible not to be struck with astonishment, wonder, and delight, at the scenes which are frequently exhibited to the eyes of them "that go down to the sea in ships." At one time, the evening serene and delightful, a pleasant breeze just filling the sails, and the bow of the vessel throwing the water to each side, as it gracefully parts the yielding waves, all round the ship, far as the eye can reach, may be seen innumerable bright spots of light, rising to the surface, and again disappearing, like a host of small stars dancing and sparkling on the bosom of the sea. At another time, the night dark and lowering, a fresh breeze urging the ship rapidly onwards through her pathless track, upon looking over the stern, in addition to the smaller specks just now mentioned, large globes of living fire may be seen wheeling and dancing in the smooth water in the wake of the rudder; now, at a great depth shining through the water, then rising rapidly to the surface, they may be seen, as they reach the top of the wave, flashing a bright spark of light, sufficient almost to dazzle the eyes of the beholder; and now again they may be traced floating majestically along, till they gradually disappear in the darkness of the water in the distance. At other times, again, when light rain is falling, or, perhaps previously to the rain coming on, when a light nimbose cloud is overspreading the sky, upon the water being agitated by the ship passing through it, or curled up by a rope towing overboard in a bight, a beautiful general luminousness is diffused all round, bright enough to illuminate the whole ship's side, and the lower large sails which may be set at the time: and it is no unusual occurrence to have this appearance so bright, that a person with little difficulty, and near the surface of the water, might be enabled to read a book by its aid.

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* "Climes are not to be changed, seas to be crossed, nor the remotest lands to be sought at the expense of life and fortune, that we may search out things unheard of and unseen; the bordering shore, our native land, lakes, ponds, rivers, every ford and every neighbouring marsh abounds in wonders."

What is the cause of this singular appearance is a question which has been often asked, has been frequently attempted to be solved, and has, till lately, been generally attempted in vain. Formerly it was alleged by some authors (Mayer, &c.), that it was from the solar light, which the sea had absorbed during the day, being given out at night: by others (Bajon and Gentil), that the phenomenon was altogether electrical; for, said they, it is excited by friction. One set of philosophers asserted that the waters of the sea were possessed, of themselves, of a phosphorescent nature, and that the appearance was purely phosphoric; and they sat down quite contented with having given it a name, without troubling themselves much about the proper meaning of that name: while another party, again, attributed the phenomenon to the putrefaction of sea water, equally contented with the last-mentioned theorisers, with assigning a cause which satisfied themselves, although it was only in other words confessing to the world their ignorance upon the subject. Nay, though the luminous bodies themselves had been examined by some naturalists, and their animal nature made obvious to their eyes, assisted by the microscope, the conclusions drawn from the examination were still wrong, and they were styled particles of an oily or bituminous nature, in order to coincide with the preconceived opinions of the observer. It was not indeed till lately that the real cause of this appearance was generally adopted, and that it was acknowledged by most authors that it proceeded from animalcules. This opinion has been slowly and gradually making its way, and, like others of this kind, has, from that very circumstance, only the more surely acquired strength and solidity. Every day's examination of the waters of the ocean establishes it the more, and already various species of these interesting little animals are known to naturalists.

It were a needless and unprofitable task to attempt to refute the theories of the various authors who have written upon the cause of the luminousness of the sea, some of which I have stated above. It cannot proceed from putrefaction, for we do not find the ocean ever in a putrid state; and moreover it is now clearly ascertained, that when fishes and other marine animals have fairly commenced the putrefactive process, their luminousness ceases altogether. No attempt has ever been made, I believe, to prove that sea-water contains phosphorus in its composition; it is therefore needless to refute an opinion which has no foundation. The idea of the sea giving out the light during the night which it had absorbed during the day, is so utterly irreconcilable with the appearance itself, that it were of as much use seriously to refute it, as to sit down and cavil with the opinion of the poet who describes the luminous nature of the sea to be

> "As though the lightnings there had spent their shafts,
> And left the fragments glittering on the field."

It is equally unprofitable to take notice of the other theories, they are all vague and unsatisfactory, they are all unsupported by facts; while the true cause, the existence of animalcules, receives support and confirmation by every day's experience, and rests upon facts, numerous and easily proved. Suffice it at present to say, that the animalcules have been caught in the very act of giving out the luminous appearance, and in vast numbers; and that, in every instance where the water has been properly examined when luminous, great quantities of animalcules have been seen; and that, on the contrary, when the water has not been luminous, the animalcules have not been present, thus affording satisfactory proof that they are the cause of the light so given out.

I have already said that a considerable variety of marine animals have been described and figured by authors as luminous. Amongst the Mollúsca, the Phòlas dáctylus has long been known to possess this property, having been described as luminous by a naturalist well known in this Society, I mean Pliny. Amongst the Vérmes, the Nèreis noctilùca is also well known. Amongst the Crustàcea, several species of the genera, Cáncer, Lyncèus, and Límulus; and, amongst the zoophytes, several species of the genera Medùs*a*, Bér*oe*, and Pennátula have long ago been described as possessing the same property, while an immense number of new genera and species have been ascertained by Dr. Macculloch, but which have never yet been published. It is with the intention, therefore, merely of adding my mite to the information already acquired upon this subject, and attempting to extend our knowledge with regard to the species of animalcules which inhabit the sea and possess a luminous quality, that I presume to offer the following descriptions and remarks.

In an excellent paper by Mr. Macartney, in the *Phil. Trans.* 1810, that gentleman describes and gives representations of a considerable number of these; and, from various observations and patient research, he concludes that on our coasts, and perhaps in general throughout the ocean, the luminousness of the sea depends chiefly upon one species, which he denominates the Medùs*a* scintíllans. During a late voyage to India and China, I had various opportunities of observing the animals which produce this effect, and of a good many of these I made sketches as accurately as I could. From these observations, and upon comparing one of the figures I made with that of Macartney, I should presume that that gentleman's opinion is so far correct, although he stops far too short in his general conclusions. Upon examining the sea water at various times, and in various parts of the ocean, I generally found that when the water was most luminous, there then was a greater abundance than at other times of small round globular bodies, of the size of grains of sand, or varying from that size to a very small pin's head. The accompanying sketches (*fig.* 81. *a b*) were

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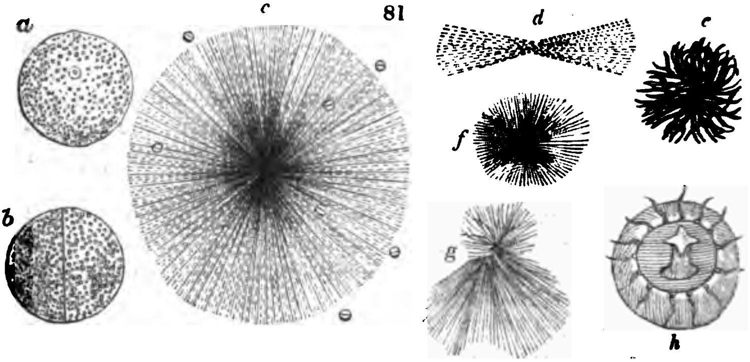

made upon examining these bodies through a microscope; and though they differ a little from the figure of Macartney, they still approach pretty near to it in general resemblance. They were perfect spheres, were covered all over with innumerable small round spots, much more distinctly so, than as figured by Macartney, and instead of a puckered opening in the centre as described by him, those I observed had a dark circular spot in the centre, with a rim round it. The circumference was rather opaque; the rest, however, with the exception of the little round spots, was perfectly transparent. At times they presented the appearance in *b*, instead of the circular spot in the centre, having a dark streak running through it, throughout its whole breadth; but generally their appearance was as represented in *a*, and frequently I observed them enveloped as it were in a gelatinous-looking bag, very thin and transparent.

A little animal was observed by Forster, off the Cape of Good Hope, to be very luminous. This is represented by Macartney, also, from Forster's original drawings; and, from its great resemblance, he considers it as the same with his

Medusa scintillans. I have copied both of these figures (*fig.* 82. *a b*, *c d*); and perhaps it may be found that both of these, and mine also, are the same animals. These little bodies were generally to be seen when the water was luminous, and at times were very abundant, especially in straits and near land. Their real size, I have already said, was generally about that of a grain of sand; but, when seen shining in the water, their apparent size was very much increased. Upon taking up a bucketful of water from alongside, and pouring it upon the deck, innumerable spots might be seen about the size of small peas, which, when taken up on the finger and carried to a light, were scarcely discernible by the naked eye. Magnified thus by the refraction of the water and their own light, when the countless millions of them are scattered about upon the surface of the sea, upon its being agitated and set in motion by the ship's way through it, the appearance then presented is beautiful in the extreme.

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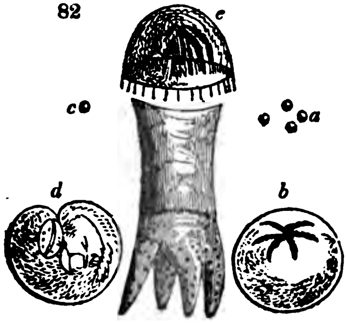

Though these little animals were the most abundant perhaps of any, there were several others that were also very numerous; and first those represented in *fig.* 81. *c* deserve to be mentioned. They occurred very frequently in the open ocean, in straits, and near land, and were most abundant at those times when the sea was very luminous. The natural size of these bodies is about half that of a pin's head; they seem to consist almost entirely of numerous tentacula, each one of which is composed of numerous joints. These apparently spring from a dark spot in the centre, which is most probably the body of the animal, though I could not make out distinctly any particular organs belonging to it. In general, when under the microscope, there were to be seen a considerable number of very small round bodies (invisible to the naked eye), attached to the tentacula, or swimming round about them, and which I only saw in company with this animal. They were wheel-shaped, transparent, with a dark streak running through the centre, and possessed considerable celerity of motion, which was of two kinds, a circular motion upon their bases, and a rotatory motion upon their axes like that of a wheel, the latter of which was perhaps the one most commonly used. Another body, which evidently belongs to the same family as the last, occurred also very frequently in company with it.

It is about the fourteenth of an inch in length, and apparently consists of tentacula alone, no central nucleus being observable. Each of the tentacula is jointed numerously, and the whole were arranged somewhat in the form of an hourglass, or like a bundle of faggots, loosely tied in the middle, and spreading out at each end. (*fig.* 81. *d*) The tentacula evidently appeared to be connected in the centre, but were loose, and unattached at the extremities. They occurred principally in the Straits of Malacca, but were also frequently seen in the open ocean. No description or representation of these two last-mentioned animals, as far as I know, has ever been given. I consider myself, therefore, entitled to conclude, in the mean time, that they are new species; but, as Dr. Macculloch has ascertained a great number of new genera, and as these may belong to some of his, I shall decline for the present giving them names. The same is to be remarked of all the other animals which I shall describe to-night: as far as I am aware they are all hitherto undescribed, and as the seas in which I procured them have never, to my knowledge, been examined by naturalists in respect to the animals in question, I may on this account be the more bold to describe them as new. Along with these last two, in the Straits of Malacca two other kinds occurred in considerable abundance. The one (*fig*. 81. *e*) was composed of short, thick, curved tentacula, disposed in a circular manner, all meeting in the centre, and entwining with each other. They were not jointed, differing materially in this respect from the two already described. The other (*fig*. 81. *f*) was composed of short straight tentacula, not jointed, disposed in a circular or oval shape, and at times as in *g*, they appeared to be as it were double, as if one were attached to and growing out of the other; natural size of the last two species scarcely that of a very small pin's point, *g* being about double the size of the others.

An exceedingly interesting little animal, a Medùs*a*, occurred once to me in the Straits of Banca, which evidently possessed a luminous property. I only procured one specimen, and it was during the day. After examination it was removed into a wineglass full of clear sea-water, and kept till evening. When taken to a dark place, the water, upon its surface being struck and agitated by the finger, immediately gave out several bright sparks. This luminousness, however, soon ceased, the agitation of the water being continued; but, when left undisturbed for some time, it seemed to recover its power, again emitting vivid flashes of light, upon being struck smartly with the top of the finger. The animal itself (*fig*.81. *h*), as seen by the microscope, appeared to consist of a hollow transparent gelatinous bag, open in the centre, and containing within it an elongated body, fixed, as it were, upon a pedestal, and divided at the summit into four lobes. The mouth of the sac was set all round with curved tentacula, somewhat resembling tadpoles, and attached by their largest extremity, in number about fourteen. The whole of these bodies, during the time the animal was under the microscope, were in constant motion, the edges of the sac contracting suddenly, and as quickly opening again; the central body and the tentacula moving simultaneously. The natural size of this interesting little animal was about that of a small pin's head. A figure of a Medùsa is given by Macartney, of the natural size, which has some resemblance to this animal I have described, but differing materially in many respects. This which I have copied from Macartney's paper (*fig.* 82. *e*), may be compared with mine. The family resemblance is sufficiently great to constitute them of the same genus. In addition to these animals, all of which may be perhaps referred to the Medùsa and Actínia tribe, there occurred two other bodies of a different figure and construction, and apparently animals. The first of these (*fig.* 83. *a*) occurred in considerable quantity, especially in the Straits of Malacca and in the Java Sea; and though I cannot say I observed these bodies distinctly luminous, they seldom occurred except at such times as when the sea was vividly so. They are composed of a series of short, oval, hollow tubes, quite transparent, finely jointed to each other by a narrow neck, and so exceedingly brittle that it was impossible to obtain any thing but frag-

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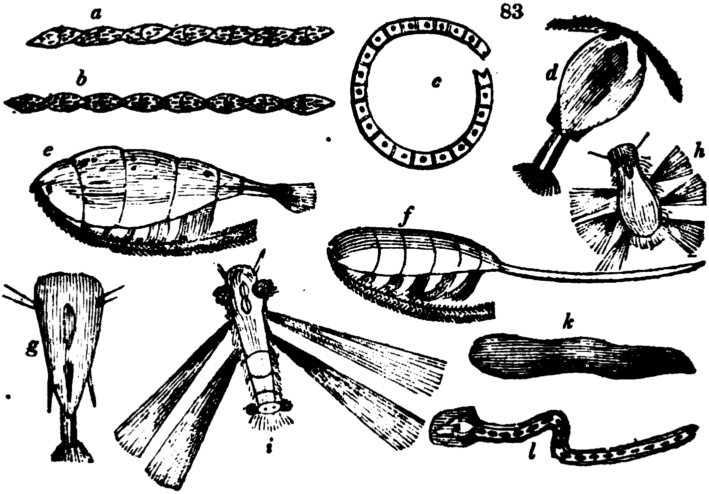

ments for examination. About the centre of each tube or division there appeared a dent or depression, marked by a dark line, and in this hollow lay a small round body like an ovum. Nearer the extremities, also, were to be seen a number of small round bodies, shaped like nails and pretty regularly disposed. In some, as in *a*, the tubes or joints seemed almost detached from each other, except where they were united by a small point. In others, as in *b*, they seemed to enter each other by a sharp point at the extremity; this difference most probably arising from the position of the objects while under examination. The natural size of each joint appeared to be not larger than a grain of sand. The other body (*fig.* 83. *c*) only occurred once to me, and it appeared also to be a fragment. It was coiled round in a circular manner like a snake, not forming a perfect circle, as the extremities, which were both open, did not meet. Through its whole length it was separated into a great many divisions or short tubes, each band of division or septum being double, and each division containing a dark spot in its centre like an ovum. Natural size about the sixth of an inch in circumference.

These eight species of animals all belong to the *A*calèpha of Cuvier; but there are other animals, more perfect and of a higher organisation, which have also been found to produce this luminousness in the sea. Several of these I have already mentioned, as two or three species of Cáncer, &c.; but there are also a good many of the Crustàcea, belonging to the order Entomóstraca of Muller, which possess this property, a few of which I have already mentioned, as the Límulus noctilùcus, an animal described and figured by Macartney (although, according to Leach, this insect is not a Límulus, but a species of a genus unknown), and the Lyncèus, which is described by Riville, and which Muller says very much resembles his L. brachyùrus. While engaged in examining the animals I have just described, several species belonging to this order, became known to me, some of which were abundant at the times that the sea was most luminous, while others, again, occurred only occasionally. Some of these are evidently luminous, others did not appear so: but, as it is well known that these little creatures have the power of giving out or retaining their luminousness at pleasure, it is not surprising that in many instances it escaped my notice; especially as they are extremely shortlived, dying very soon after being taken up out of the sea. The observations, too, of several naturalists of late, as Dr. Macculloch, go far to prove that the property of giving out light is in all probability possessed by all these little inhabitants of the deep; and, as this faculty is evidently given to them as a defence and protection, and to enable them to take their prey in their deep and dark abodes in the fathomless waters of the ocean, it is extremely probable that it is given to the whole tribe of marine animals. Independently of this, however, some of these little creatures are extremely interesting, and, as little has been added to this order of beings since the time of Muller, figures and descriptions of several new species, although these are perhaps rather imperfect, may still be worthy of notice; and, even though they are not sufficiently correct to entitle them to be classified and named, it is possible they may assist future labourers in this much neglected branch of natural history.

One of these Entomóstraca, which occurred several times in company with those luminous animals already described (*fig.* 81. *a b c d*), and in considerable abundance when the sea was most luminous, is figured in *fig.* 83. *d.* The head and body are in one, flat, of an oval shape; tail double, each portion terminated by a fasciculus of fine hairs; antennæ two, linear, armed with hairs or bristles on both sides, which point forwards; eyes two, situated laterally, and near the upper part of the body. Near the lower extremity of the body, close to the tail, were two dark substances projecting outwards, most probably the ovaries. The body of the animal was quite transparent, and showed the viscera and the red blood in motion; natural size, a grain of sand. This little animal bears a considerable resemblance to one of Muller's figures, a species of Cy̆clops; but as that genus is characterised as having only one eye, and as I made out distinctly two in this specimen, I cannot, till another opportunity occurs of farther examination, refer it to that genus. Two other little creatures, however, occurred, which I have no hesitation in referring to the Cy̆clops of Muller. (*fig.* 83. *e* and *f*) One or two species have been ascertained, by Sir C. Giesecké in Greenland, to be luminous, and Dr. Macculloch has added thirty-three new species in our own seas, all of them highly luminous. The first of these which I have represented (*fig.* 83. *e*) is an exceedingly nimble little creature; and, not being larger than a pin's point, it required great attention to be able to follow its movements. The body is of an oval shape, divided into five segments; antennæ two, linear, covered with prickles or hairs, and fully the length of the body; feet about five on each side; tail double, each division terminated by a number of fine hairs; eye, one; the round spots on the upper surface of the body are ova. This species somewhat resembles the C. rŭbens of Muller (Entomóstraca, tab. xvi. fig. 3.); it is, however, a very distinct species. *Fig.* 83. *f* is also a Cy̆clops, possessing great rapidity of motion, and almost eluding observation as it darts through the water; body oblong, divided into six segments; tail consisting of two long fine hairs or setæ, fully the length of the body of the animal; eye, one; antennæ two, linear, beset with setæ; feet about five on each side; a very distinct species from the last, and very different from any of Muller's. *Fig.* 83. *e* is the more common of the two, occurring in the Atlantic, Straits of Malacca, &c.; *f* I only observed in the Straits of Malacca. *Fig.* 83. *g* belongs to a different genus altogether; head and body in one; very obtuse at the upper extremity, and gradually tapering towards the tail, which consists of two divisions, each terminated by a cluster of fine setæ; eyes two, lateral and inferior. From under these, on each side, are projected two short antennæ. I could only see this animal in a prone situation, and on that account could only see two legs near his lower extremity. The colour of this curious little creature was of a beautiful silvery hue, with a pearly lustre: the body was transparent, and his viscera and red blood could be distinctly seen in constant motion. Natural size, a grain of sand; found in the Straits of Malacca. *Fig.* 83. *h* is an exceedingly minute animal, but not possessing such celerity of motion as several of the last-mentioned; head rather large and obtuse; body oval, connected to the head by a narrower portion, or neck; eyes, two; antennæ four, the inferior of the two shorter than the upper ones; no tail; lower extremity of the body emarginate; body hairy; natatory feet collected into three clusters on each side, nearly half the length of the body. This animal was quite transparent, and in the upper part of the body the mouth could be distinctly seen, of an oval shape, opening and shutting at the will of the animal. Habitat, Straits of Malacca.

These little animals are extremely interesting in many respects; but there was one which I observed still more so than any other yet described, not from his motions, which were surpassed in quickness by the Cyclops, nor from his colour, which was far exceeded by *fig.* 83. *g*, but from his animal economy and the curious provisions with which he is endowed for catching his food. This extremely interesting little animal is represented in *fig.* 83. *i*, and appears to belong to the same genus as the last. Body oblong, divided into five segments, the upper one the largest, the lower one oval and smaller than the rest; head large and obtuse; eyes two; antennæ four, two on each side, one much shorter than the other; natatory feet consisting of four clusters, two on each side, as long as the body of the animal, which was covered at the sides with long hairs. On each side, about the middle of the head, and also on each side of the last segment of the body, or what, perhaps, may be termed the tail, there is attached a circular fasciculus of fine short hairs; the body being quite transparent, the mouth and viscera could be plainly seen. Its motion was rather slow, the long hairs composing its natatory feet were gently put in motion, so as slowly and gracefully to carry him a short distance through the water; he would then stop, and immediately set the circular fasciculi of short hairs already mentioned, at his upper and lower extremities, in motion, which was so exceedingly rapid as at first to escape detection. This very quick circular motion produced a regular whirlpool in the water around him, which extended in a very short time to a considerable distance, the mouth of the animal forming the centre of the vortex. The objects all round about were thus put in motion, and sucked into the part where his mouth is situate, which at such times was constantly and rapidly contracting and dilating, swallowing some objects and rejecting others, the viscera at the same time having evidently a strong vermicular motion. It appeared to be very rapacious, as the whole time it was under the microscope it seemed to be almost constantly in search of food. Found in the Straits of Malacca. The whole construction and motions of this singular little being were extremely interesting; and although in general the animals of this nature are so exceedingly minute in their structure, as to render them very apt to be overlooked, and even when once seen, to be thrown aside as unworthy of a rational being's attention, who could witness the beautiful provision of nature for the supply of such a diminutive creature as this described, scarcely the size of a small pin's head, without agreeing with Muller, the best historian of this family of created beings? "Nosci digna hæc animalcula, non quia Deus maximus in minimis est, æque enim magnus in omnibus, at ob eximiam membrorum exilitatem, miram organorum diversitatem, varia Creatoris eundem finem obtinendi media, et pulchritudinem et proportionem quam nihil excellit." *

I have still two other animals to describe, belonging, however, to different classes from the last mentioned. The one (*fig.* 83. *k*) is evidently a Planària, in its motion very much resembling the leech; natural size, a grain of sand; colour white; found in the Straits of Malacca. The other (*fig.* 83. *l*) belongs to a genus unknown to me. It is exceedingly nimble in its motions; the head, which is rather large and unshapely, was enveloped in a membranous bag, which seemed also extended over the whole body. It was quite transparent, the body spotted with bars of a dark colour. Found in the South Atlantic Ocean.

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* "These animalcules deserve to be known, not because God is greatest in smallest things, for he is equally great in all things, but on account of the extreme tenuity of their members, the wonderful diversity of their organs, the various means used by the Creator for attaining the same end, and a beauty and proportion which nothing excels."

In drawing up this paper for the Society, I have not gone to any length to endeavour to *prove* that the luminousness of the sea is caused solely by the presence of animalcules, and this, for the following reason, viz., that there scarcely now exists a doubt upon the subject. Any arguments which I could have produced may be found much better expressed and more forcibly illustrated by referring to Dr. Macculloch and Mr. Macartney. I should like, however, to make two remarks before I close this, I am afraid, uninteresting paper.

In the first place, then, I should like to correct an error into which, I conceive, Dr. Macculloch has fallen, an error produced by his wandering a little into theory, and neglecting facts and experience. He has stated that in general, when the sea is luminous, we will find the colour of the water to be greenish; and, on the other hand, that we will never see the blue water of the ocean possessed of a luminous appearance; "for," says he, "the phenomenon is never seen except when animalcules are present in the water, and the blue colour of the ocean depends upon the circumstance that there are no animalcules to be found in it, therefore we will never find this water to be luminous." I perfectly agree with him as to the cause of the light given out by the sea; but, I humbly conceive, with regard to his other statement, he is decidedly incorrect. Not only does the luminousness of the sea occur in blue water, but I have myself caught numerous animalcules in it, which evidently produced that luminous appearance; and this fact will be found, instead of invalidating his former opinion, to strengthen it the more, as it shows clearly that in all parts of the sea, when the water is possessed of a luminous quality, there animalcules are to be found.

2dly, It is an opinion held by sailors, and which is to be found as having prevailed amongst that class of people from the earliest times, that the luminousness of the sea is a forerunner of stormy weather; and this opinion has even been taken up and defended by several authors, who have written upon this subject. Having long been aware of this fact, it amused me not a little to observe a work published about two years ago, in which the author very modestly assumes to himself the merit of the discovery, that this appearance in the sea is a presage of a storm. Not only is this assertion perfectly gratuitous on the part of our author, the very same observation having been handed down from one generation to another for perhaps several centuries; but it is, even, like many other popular opinions, founded in error, or at least upon very limited experience. Many a heavy gale have I encountered, yea, even hurricanes have swept over us while on the deep, without their having ever been so kind as to send a host of bright scintillators to warn us of our danger; and had any confidence been placed on this vulgar opinion, and had we trusted to the Medùs*a* scintíllans, or the *C*ǎncer fúlgens, instead of our barometer or sympiesometer, instead of now addressing the Plinian Society, I had perhaps long ago been buried deep in the fathomless waves of the Atlantic Ocean. The fact of the matter is, that very frequently these little animals seem, like many others of the animal kingdom, to be aware of the change of weather; and, instead of giving warning by their shining brighter at such times than they did before, they disappear altogether, no doubt taking refuge from the agitation of the waves by descending to a more secure situation deep in the water. And even when at times, as it no doubt occasionally does happen, the sea in bad weather is particularly luminous, it is evidently produced by large Medùs*æ*, such as the M. pellùcens of Sir J. Banks, and other large animals, and only takes place when the gale has already arrived, being nothing more than a concomitant, not the forerunner, of an agitated sea. From my own observations upon this subject, were I to say that it is at all connected with meteorological appearances, I should be disposed to believe that it is more brilliant and more generally diffused over the surface of the water, immediately before or during very light rain, not absolutely during a calm, but when there is only a gentle breeze at the time. I have frequently observed at such times the sea particularly luminous, and have also heard it remarked by seamen as a forerunner of rain. This, however, like every other prognostic, frequently fails, only showing how little all such prognostics are to be attended to.

Park Street, Edinburgh, July 14. 1829.

Art. III. *Account of an Ornithological Visit to the Islands of Shetland and Orkney, in the Summer of* 1828. By Richard Drosier, Esq.

Sir,

From the perusal of one of your interesting Numbers of the Magazine of Natural History, I am induced to forward you an account of the commencement of my researches through the Islands of Shetland and Orkney, in the summer of 1828, in the ornithological department of zoology; possibly you may honour it with a place in your pages.

One of the principal objects that drew me to Shetland was a wish to obtain a specimen of the skua gull (Léstris Cataráctes); and to have an opportunity of seeing and observing him in his native haunts. Foula, a small and rocky island situated about thirty miles to the westward of Mainland, is the principal resort of this bird; and to its high and lofty hills it annually arrives for the purpose of incubation. It being then the fishing season, I had some difficulty in obtaining a passage over, as on that depends the Shetlanders' sole existence in the winter. Having, however, through the friendly assistance of Mr. Scot, the proprietor of Foula, at last procured a boat, a fair wind and a few hours brought me to the general landing-place of the island. The accommodations here are miserably bad: two old chairs and a few blankets were the sole apology for a bed; and, as for food, milk and oat-cake of the coarsest kind can only be obtained, together with a few eggs; but the ornithologist, with the assistance of his gun, is able to subsist very tolerably upon the wild pigeons and a few snipes.

Foula is certainly a romantic curiosity, being about three miles in circumference; a range of lofty hills, presenting their cone-shaped summits, traverse it from south-east to north-west; and the ascent upon the north-east side is extremely steep, so much so, that, to attain the top, it is necessary to catch hold of the dwarf heather at every step; on the other side, they gradually slope away to the sea, and, ending abruptly, present the most stupendous and awful precipices. The natives are kind and hospitable, ever willing to lend you all the assistance possible, to guide you through the cliffs, scale the rocks, and brave the most perilous dangers, with a careless indifference; for, nursed from infancy amid the roar of winds and waves, and the boiling lash of the foaming surge, they traverse, with perfect ease, the most towering and splinter-shaped pinnacles of rock, in quest of wild fowl for subsistence.

The skua gull, called by the natives *Buncie*, is held and cherished by them with the greatest veneration and kindness; and nothing hurts their feelings more than to see the death of their favourite bird. I was particularly requested, upon my first arrival, by two or three elderly natives, to spare this bird; as to the skua were almost entirely trusted the care and protection of their lambs, during the summer months, that are always allowed to wander unrestrained over the island. These birds possess an inveterate dislike against the eagle and raven; for no sooner does the broad and rounded wing of the eagle appear emerging from his rocky habitation amid the cliffs, than the skua descends upon him from the tops of the mountains, in bodies of three or four, and never fail to force the eagle to a precipitate retreat. The natives always reward his services, by casting from their boats the refuse portion of the fresh-caught fish, which he seizes with greedy avidity, snatching it almost from the hands of the fisherman.

I was particularly amused one evening, when standing at the foot of the loftiest hill (called by the natives Snuge), with the following circumstance: — An eagle was returning to his eyry, situated in the face of the western crags, in appearance perfectly unconscious of approaching so near to his inveterate foe, as, in general, the eagle returns to the rocks from the sea, without ever crossing the smallest portion of the island. This time, however, he was making a short cut of it, by crossing an angle of the land. Not a bird was discernible: a solitary skua might, indeed, be occasionally seen, wheeling his circling flight around the summit of the mountain, which was already assuming its misty mantle. As I was intently observing the majestic flight of the eagle, on a sudden he altered his direction, and descended hurriedly, as if in the act of pouncing; in a moment, five or six of the skua passed over my head with an astonishing rapidity; their wings partly closed and perfectly steady, without the slighest waver or irregularity. They appeared, when cleaving the air, like small fragments of broken rock, torn and tossed by a hurricane from the summit of a towering cliff, until, losing the power that supported them, they fell prone to the sea beneath. The gulls soon came up with him, as their descent was very rapid, and a desperate engagement ensued. The short bark of the eagle was clearly discernible above the scarcely distinguished cry of the skua, who never ventured to attack his enemy in front; but, taking a short circle around him, until his head and tail were in a direct line, the gull made a desperate sweep or stoop, and, striking the eagle on the back, he darted up again almost perpendicular; when, falling into the rear, he resumed his cowardly attack. Three or four of these birds, thus passing in quick succession, invariably succeed in harassing the eagle most unmercifully. If, however, he turns his head previously to the bird's striking, the gull quickly ascends, without touching him. This engagement continued some time, the eagle wheeling and turning as quickly as his ponderous wings would allow; until I lost the combatants in the rocks. As soon as this is the case, the gulls leave, and quietly return to the mountain.

Snuge being the highest mountain is usually chosen by the skua gull as his retreat in the breeding season. The female, which is somewhat smaller than the male, makes her nest in the long coarse herbage of the mountain; and generally lays four eggs, of a dirty greenish colour, very faintly and obscurely blotched with spots of a brownish cast, principally at the larger end. When the young are hatched, the old ones are then very savage, and will unhesitatingly strike either man or beast that attempts to molest them by approaching too near to their nests. Their mode of attack is always from behind; never, by any chance, in front. Probably, the reason for this caution is to avoid any blow which they would naturally receive if their intentions were discovered; as they would be, if the birds approached in any direction but behind. It is surprising how dexterously they will avoid an attempt to strike them, by a rapid and almost perpendicular ascent, even if they have advanced within a foot of your shoulders. To avoid them, it merely requires to be on your guard; and, when a bird stoops, to face him immediately, or you are most likely to suffer for your neglect by a good smart blow on the shoulders.

Bewick has given a not very clear description of this bird; therefore, the following one may, possibly, not be disagreeable to your readers: —

In dimensions and weight, Bewick's is tolerably correct. His head is of a dark brown, each feather margined with dull white; the auriculars and cheeks are covered with fine, narrow, pointed, hackle-like feathers, the points of which are of a yellowish colour; as is also the back of the head, extending almost to the shoulders. The neck is of a darkish brown, each feather sharply pointed with yellowish rust-colour, until, gradually extending, they form waving bars of the same colour across the breast. The belly is of a rusty colour, waved and obscurely marked with ash; under tail-coverts the same. The back, greater and lesser coverts, and tertials, are dark brown, dashed and freckled with ash and rust colour; the tertials more so than the rest. The roots of the primaries white, extending along the inner webs; extremities nearly black; bastard wing dark, each feather sharply pencilled with dull white. Tail, consisting of twelve feathers, dark ashy brown. Bill and claws hooked, the inner claw more so than the rest; eye dark.

On the southern side of the island is one of the most magnificent and stupendous cliffs or faces of rock that I ever beheld; it consists of a lofty mountain, entirely isolated, resembling a cone split or divided from its very summit to the sea; and, as viewed from the sea in a boat, strikes the imagination as the brickwork of a gigantic fortress, being in itself perfectly mural, with scarcely a broken chasm or rent observable, so regular and so beautiful is this bulwark of nature; the strata of which are uniformly of a reddish cast. This face is estimated to be about 1500 ft. above the level of the sea, and is resorted to by innumerable hosts of aquatic birds, the kittiwake (*LàrusRíssa* L.) and guillemot (*Colýmbus Troílle* L.) occupying the lowest part; above them, the herring gull (*Làrus* fúscus *L.*) and a few of the black-backed gull (*Làrus* marìnus *L.*); and, higher still, the Mank's puffin (Procellària *Puffìnus* L.), stormy petrel (Procellària pelágica *L.*), and common puffin (*Á*lca árctica *L.*); the whole forming a scene truly delightful to the eye of the ornithologist.

As the stormy petrel is scarcely ever to be seen near the land, except in very boisterous weather, one of the natives, for a trifling remuneration, agreed to traverse the face of this rock, and take me some from out its fissures. Accordingly, accoutred with a rope of hemp and hogs' bristles, coiled over his shoulders, he proceeded to the cliff, having made one end fast by means of a stake, he threw the coil over the face of the rock, and gradually lowered himself down, but with the utmost caution and circumspection, carefully pressing his foot hard upon the narrow ridges before he at all loosened his firm grasp of the rope, which he never altogether abandoned. I had previously thrown myself upon my chest, to enable me to have a better view of him, by looking over the cliff; and, certainly, to see the dexterity and bravery with which he threw himself from one aperture to another was truly grand. The tumbling roar of the Atlantic was foaming many hundreds of feet beneath, and dashing its curling cream-like surge against the dark base of the cliff, in sheets of the most beautiful white; while the herring and black-backed gulls, alternately sweeping past him so as to be almost in reach of his arm, threw a wildness into the scene by the discordant scream of the former, and the laughing oft-repeated bark of the latter. This, however, he appeared entirely to disregard; and, continuing his search, returned in about half an hour with seven or eight of the stormy petrel, tied up in an old stocking; and a pair of the Manks puffins, together with their eggs. The birds, he told me, he had no difficulty in capturing. The eggs of the stormy petrel are surprisingly large, considering the diminutive size of the bird, being as large as those of the thrush. The female lays two eggs, of a dirty or dingy white, encircled at the larger end by a ring of fine rust-coloured freckles. The birds merely collect a few pieces of dried grass, with a feather or two, barely sufficient to prevent the eggs from rolling or moving on the rock. That of the Manks puffin (the bird laying but one) is of a very round shape, and uniformly white, very much resembling that of a hen. These birds very often excavate a small hole, if the stratum is soft enough to admit of it, like the common puffin (*Alca* árctica *L.*), by means of their small sharp claws, on the ground of which they deposit their single eggs.

The north-eastern side of the island is principally occupied by the arctic gulls (Léstris parasíticus *L.*), which breed there very plentifully upon the low and mossy levels, by the edge of a small lake or pond. As the young were already hatched, I had an opportunity of observing them, several of which I discovered concealed in the long grass; and, although many of them were covered with nothing but down, still the blue legs and black toes were very distinct, which corroborated, beyond all doubt, the surmises that the arctic gull and black-toed gull (Léstris crepidàtus *L.*) are the same: in fact, I afterwards, in the other islands, shot many of them upon the breeding grounds of the arctic gull. Some had not lost the down off their heads, and were a beautiful light-brownish colour, distinctly barred, and spotted with black; and in some, as the bird advanced in growth, the brown colour was gradually disappearing, until, in many specimens, only a very few brown marks were discernible; the middle tail-feathers commenced to elongate, and the bluish cast of the legs became darker, and indistinctly blotched with blackish spots; whence I am led to conclude that they ultimately become black, and assume the rough appearance peculiar to the Léstris genus.

I am, Sir, &c.

Richard Drosier.

Morston, Holt, Norfolk, May 5.

Art. IV. *An Account of the Mode in which the common Frog takes its Food.* By the Rev. W. T. Bree, A.M.

Sir,

I suppose there can be no one of your readers who has not repeatedly seen the common frog; and perhaps very few of them, comparatively, who have ever seen the animal in the act of taking his food. As I do not at this moment recollect to have met with any particular account of the operation in books of natural history, it occurs to me that a short notice of it may not be unacceptable to some, at least, of your readers. The friend to whom I am indebted for having first called my attention to this amusing exhibition was himself introduced to it by mere accident. He happened to be repotting some green-house plants, and meeting with a moderate-sized worm among the roots of one of them, he carelessly threw it aside into a damp corner near the green-house. Almost immediately a frog issued from his lurking-place hard by, commenced his attack upon the worm, and soon despatched it. Another worm was thrown to him, which he treated in the same manner. But the amusing part of the business is to watch the manner in which the frog first notices his prey; and this I can compare to nothing so aptly as to what, indeed, it very much resembles, a pointer-dog setting his game; he makes, in short, a dead set at it, oftentimes, too (if the relative position of the two animals so require it), with a slight bend or inclination, more or less, of the forepart of the body to one side, just as we often see a pointer turn suddenly, when the game is on one side of him, and he has approached very near before he has perceived it. After a pause of some seconds or more the frog makes a dart at the worm, endeavouring to seize it with his mouth; in this attempt he frequently fails more than once; and generally waits for a short interval, acting the pointer, as it were, between each attack. Having succeeded at last in getting the worm into his mouth, if it be a large one, he is unable to swallow it immediately and all at once; and the portion of the worm which yet remains unswallowed, and extends out of the mouth of its destroyer, of course wreaths about, and struggles with a tortuous motion. With much, but somewhat grotesque, dexterity, the frog then employs his two fore feet, shoving and bandying the worm, first with one, and then with the other, in order to keep it as nearly as may be in the centre of his mouth, till the whole is swallowed. Any of your readers who are fond of marking the actions and habits of animals I strongly recommend to try the experiment.

They have only to find a frog, taking care not to alarm him more than need be, and throw down a worm near him, and they will be pretty sure to be soon gratified by the sight of what I have endeavoured, however imperfectly, to describe. I ought to add that, to be successful, the experiment should be made in the summer, say June or July, as I am informed (but do not vouch for the fact) that, except for a few months in the summer, the frog is wholly abstemious.

What an admirable subject would the above have been for Bewick! Had he ever chanced to have witnessed the scene, I doubt not but we should have had from the hand of this incomparable artist an exquisite tail-piece or two representing the attitude and actions of a frog eating! And I have still less doubt, that, had he executed the vignettes with his usual truth, spirit, and vivacity, many an inexperienced person would have looked upon them as being rather the burlesque and fanciful offspring of his fertile genius conceived in one of its more facetious moods, than as exact and faithful portraitures of nature.

Yours, &c.

W. T. Bree.

Allesley Rectory, December 10. 1829.

Art. V. *Observations on the Habits and Nidification of the Bearded Titmouse* (*Pàrus biármicus* L.). By J. D. Hoy, Esq.

Sir,

I have a few remarks to offer you on the habits of the Bearded Titmouse (Pàrus biármicus), which may be acceptable to some of your readers; and I think your correspondent on this subject (Vol. II. p. 222.) will be pleased to hear something farther of its history. The borders of the large pieces of fresh water in Norfolk called Broads, particularly Hickling and Horsey Broads, are the favourite places of resort of this bird; indeed it is to be met with in that neighbourhood wherever there are reeds in any quantity, with fenny land adjoining. During the autumn and winter they are found dispersed, generally in small parties, throughout the whole length of the Suffolk coast, wherever there are large tracts of reeds. I have found them numerous, in the breeding season, on the skirts of Whittlesea, near Huntingdonshire, and they are not uncommon in the fenny district of Lincolnshire; whether they are to be met with farther north I have had no means of ascertaining, but they do not appear to have been noticed north of the Humber. It begins building in the end of April. The nest is composed on the outside with the dead leaves of the reed and sedge intermixed with a few pieces of grass, and invariably lined with the top of the reed, somewhat in the manner of the nest of the Reed Wren (S. arundinàcea *L.*), but not so compact in the interior. It is generally placed in a tuft of coarse grass or rushes near the ground, on the margin of the dikes, in the fen; also sometimes fixed among the reeds that are broken down, but never suspended between the stems. The eggs vary in number from four to six, rarely seven; pure white, sprinkled all over with small purplish red spots, intermixed with a few small faint lines and markings of the same colour; size about the same as those of the Greater Titmouse, but much more rounded at the smaller end. Their food during the winter is principally the seed of the reed, and so intent are they in searching for it, that I have taken them with a birdlime twig attached to the end of a fishing-rod. When alarmed by any sudden noise, or the passing of a hawk, they utter their shrill musical notes (which your correspondent has well described), and conceal themselves among the thick bottom of the reeds, but soon resume their station, climbing the upright stems with the greatest facility. Their manners in feeding approach near to the Long-tailed Titmouse, often hanging with the head downwards, and turning themselves into the most beautiful attitudes. Their food is not entirely the reed seed; but insects and their larvæ, and the very young shell-snails of different kinds which are numerous in the bottom of the reedlings. I have been enabled to watch their motions when in search of insects, having, when there has been a little wind stirring, been often within a few feet of them, quite unnoticed, among the thick reeds. Was it not for their note betraying them they would be but seldom seen. The young, until the autumnal moult, vary in plumage from the old birds; a stripe of blackish feathers extends from the hind part of the neck to the rump. Your correspondent has been informed the males and females keep separate during the winter, but I have always observed them in company; they appear to keep in families until the pairing time, in the manner of the Long-tailed Titmouse; differing in this respect, that you will occasionally find them congregated in large flocks, more particularly during the month of October, when they are migrating from their breeding places.

Yours, &c.

J. D. Hoy.

Stoke Nayland, March 31. 1830.

Art. VI. *Some Account of the Stickleback Fish* (*Gasterósteus aculeàtus*). By O.

Sir,

I send you the following short account of a little fish which is found in almost all our rivers, brooks, and ponds, well known by the name of Stickleback. It is the Gasteróstaus aculeàtus of Linnæus (*fig.* 84.), and is thus described by

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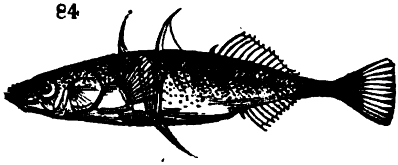

Pennant in his *British Zoology*, vol. iv. p. 353:—"Branchiostegous rays, three; belly covered with bony plates; fin one, dorsal, with several sharp spines between it and the head." He further says, "These are common in many of our rivers, but no where in greater quantities than in the fens of Lincolnshire, and some of the rivers that creep out of them. At Spalding there are, once in seven or eight years, amazing shoals that appear in the Welland, and come up the river in form of a vast column. This species seldom reaches the length of 2 in.; the eyes are large; the belly prominent; the body near the tail square; the sides are covered with large bony plates, placed transversely. On the back are three sharp spines, that can be raised or depressed at pleasure; the dorsal fin is placed near the tail; the pectoral fins are broad; the ventral fins consist each of one spine or rather plate, of unequal lengths, one being large, the other small; between both is a flat bony plate, reaching almost to the vent; beneath the vent is a short spine, and then succeeds the anal fin; the tail consists of twelve rays, and is even at the end. The colour of the back and sides is an olive green; the belly white; but in some the lower jaws and belly are of a bright crimson." Having, at various times, kept these little fish during the spring, and part of the summer months, and paid close attention to their habits, I am enabled, from my own experience, to vouch for the facts I am about to relate. I have generally kept them in a deal tub, about 3 ft. long, 2 ft. wide, and about 2 ft. deep. When they are put in for some time, probably a day or two, they swim about in a shoal, apparently exploring their new habitation. Suddenly one will take possession of the tub, or, as it will sometimes happen, the bottom, and will instantly commence an attack upon his companions; and if any of them ventures to oppose his sway, a regular and most furious battle ensues: they swim round and round each with the greatest rapidity, biting (their mouths being well furnished with teeth) and endeavouring to pierce each other with their lateral spines, which on these occasions are projected. I have witnessed a battle of this sort which lasted several minutes before either would give way; and, when one does submit, imagination can hardly conceive the vindictive fury of the conqueror, who, in the most persevering and unrelenting way chases his rival from one point of the tub to another, until fairly exhausted with fatigue. From this period an interesting change takes place in the conqueror, who, from being a speckled and greenish-looking fish, assumes the most beautiful colours; the belly and lower jaws becoming a deep crimson and the back sometimes a cream colour, but generally a fine green, and the whole appearance full of animation and spirit. I have occasionally known three or four parts of the tub taken possession of by as many other little tyrants, who guard their territories with the strictest vigilance, and any the slightest invasion brings on invariably a battle. As may be expected, they usually fight best on their own ground, and the invader is generally repelled; but, when the contrary occurs, the victor adds the defeated party's possessions to his own. A strange alteration takes place, almost immediately, in the defeated party; his gallant bearing forsakes him; his gay colours fade away; he becomes again speckled and ugly; and he hides his disgrace among his peaceable companions who occupy together that part of the tub which their tyrants have not taken possession of; he is, moreover, for some time the constant object of his conqueror's persecution. It is scarcely necessary to observe that these are the habits of the male fish alone: the females are quite pacific; appear fat, as if full of spawn; never assume the brilliant colours of the male, by whom, as far as I have observed, they are unmolested. The bite of these little furies is so severe that I have frequently known it, when inflicted on the tail, produce mortification, and consequently death. They also use their lateral spines with such fatal effect, that, incredible as it may appear, I have seen one during a battle absolutely rip his opponent quite open, so that he sank to the bottom and died. Another fact in the history of these interesting little creatures also deserves notice; it is curious, and to me unaccountable. Previously to death, they reassume all their brilliant colours, which they may have lost from defeat, but they are not so clear and distinct as when in the height of their power. We have occasionally had, along with the others, a variety perfectly black: this is undescribed by Pennant. Of course, no great alteration in colour takes place in this, except that, during their fighting career they probably look somewhat blacker. These sable heroes fight, I think, with greater obstinacy than the others. I could relate some further facts concerning these curious fish, but probably enough has been said to awaken a little curiosity. Never having met with an account of them before I am induced to think that their history is not generally known, and, under that impression, I send you what I know of them, to insert or not, as you may judge fit, in your Magazine.

I am, Sir, &c.

London, September 9. 1828. O.

Query. — Is not the black variety the Gasteróstei pungítius (*fig.* 85.) of Linnæus and Pennant? which is frequently black, is a longer-shaped fish than the G. aculeàtus (*fig.* 84.), and has ten dorsal fins? I have been told these fishes will kill gold fishes if confined in the same globe with them. — *J. D. C. S. Feb.* 3. 1829.

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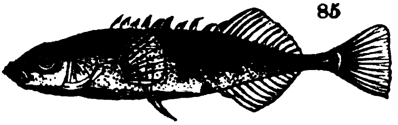

ART. VII. *Notice of the Capture of Vanéssa Húntera, for the first time in Britain, with a Catalogue of rare Insects captured.*

By J. C. DALE, Esq.

Sir,

ON the arrival of every new Number of your Magazine of Natural History, I am on the look-out for new discoveries in (especially British) entomology, the most extensive branch of natural history; and as such information, I believe, will be acceptable to many of your readers, I beg to announce (should not Captain Blomer have previously given you the particulars), for the first time, the capture of Vanéss*a* Húnter*a* in Britain, by Captain Blomer, at Withybush, near Haverfordwest, South Wales (about ten miles from a seaport), in July or August, 1828; which was, till very lately, considered by him as a small and odd variety of V. cárdui (or Painted Lady Butterfly), and which he has very handsomely added to my cabinet. Dr. Turton describes it as a native of North America (alone, I believe), from which place it might have been imported; but that remains to be proved, as I never yet heard of the importation of a *P*apílio in this way, although beetles, &c., in timber are of frequent occurrence at seaports. However, it ought to be recorded; and I hope it may lead to further enquiry as to its British nativity or not. Many species of moths (Erástria únca and Banks*iàna*, &c., for instance), of the same species as found in America, have also been captured in plenty, inland; and, no doubt, they are aboriginal British: but on this point there are various opinions; and as many errors have crept into the history of our British insects, I subjoin an extract from my own catalogue, with a view to correction, and proof of their title to stand in, or to be expunged from, the British list.* I am, Sir, &c. J. C. DALE.

Glanville's Wooton, Dorset, Jan. 3. 1830.

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* I have just taken a most curious Stýlops? (Wálkeri?), by sweeping some flowers on the Hill, not quite so large as ♂♀, and the antennæ, &c., very different from Curtis's figures in his *British Entomology*; and I found the genus Halíctus infested with the larvæ of this order (Strepsíptera), in the spring, in the New Forest. — *J. C. D. June* 11. 1830.

Name.	Date of Capture.	Initials of Captor.	Habit and Locality.	County.	Part of Kingdm.	Captor or Authority.	Reference to page or letter.	Cabinet.	♂	♀	T	Whence obtained and when, &c.
Papilio Podalirius (Considered by many doubtful as British.)	Prior to 1710	J. R.	Seen?	—	E.?	Rev. J. Ray; see his Hist. Ins.	111					
	1778?	? R.	Near Beverley	Yorkshire	} -	Mr. Ripon? Haw. Lep. Br.	Preface	Late in Mr. Ripon's?	-	-	1	(Lost by fire.)
			A wing found near Beverley?	Yorkshire								
	Prior to 1795?	J. B.?	Rare, in woods	Cambridg.	-	Dr. Berkenhout? Synops. Haw. Lep. Brit.	123 6 & 97	Late in Dr. Berkenhout's?	-	-	1	(Lost?)
	July 9. 1818?	J. C. D.	Seen? near Eltysly, settled on some rushes	Cambridg.	-	J. C. Dale?						
	May *, 1803	C. A.	Clapham Park. Wood near Bedford	Bedfords.	-	Late Dr. Abbot, in Haw. Lep. Brit.	Preface	J. C. Dale's.	-	1	-	Museum of Dr. Abbot, 1817. ‡
	Aug. 24. 1810	H. S.	Seen settled on the road from Norwich to Salthouse	Norfolk	-	H. Sims, Esq.						
	—	?	A wood near Oxford †	Oxon	-	A friend of Mr. Backhouse, in Steph. Illust.	145	Mr. ———? of Sunderland	-	-	2	
	(larva) 1807	Mrs. P.	Wild bullace, Netley	Salop	-	Mrs. Plymley	5, 6, 9, 10, & 11.	Mrs. Plymley's	-	-	1	
	1822	F. W. H.	Netley	Salop	-	Rev. F. W. Hope		Mr. Hope's	-	-	1	
	Sept.? 1829	F. W. H.	Seen settled on a peach, Netley	Salop	-	Rev. F. W. Hope.						
	— &c. §	? H.	New Forest &c.	Hants	-	— Hawkins, Esq., in Ingpen's Instructions	—	Mr. Hawkins's	-	-	1	
Póntia Daplidice	Prior to 1735?	? V.	Hampstead	Middlesex	-	Mr. Vernon, in Petiv. Pap.						
	Prior to 1735?	? V.	Gamlingay?	Cambridg.	-	Mr. Vernon, in Ray	116					
	June, 1803	C. A.	Near Gamlingay (White Wood)	Cambridg.	-	Dr. Abbot, in Haw. Lep. Brit.	Preface	J. C. Dale's	1	1	2	Museum of Dr. Abbot.
	July e.? 1818	J. S. M.	Meadow near Keynsham	Somersets.	-	Mr. Miller, A.L.S. ‖	1	Mr. Miller's	-	-	1	
	—	?	Near Bath	Somersets.	-	———? in Lewin.						
	—	L. G.	Near Oxford	Oxon	-	Rev. L. Guilding	—	Mr. Millard's	-	1	-	Rev. L. Guilding.
	Aug. b. 1826	R. L.	Near Dover Castle	Kent	-	Mr. Leplastrier	3	Mr. Leplastrier's	1	-	1	
	1827	? L.	Near Dover Castle	Kent	-	Mr. Leathes in Mr. Sparshal's letter	11	Mr. Sparshal's	1	-	-	Mr. Leathes.
	Aug. 14. 1818	J. F. S.	On a thistle near Dover Castle ¶	Kent	-	J. F. Stephens, Esq. See his Illust.	—	Mr. Stephens's	-	1	1	
Doritis Apóllo	Recently, 1812?	?	Isle of Lewis? One of the Hebrides	—	S.?	A tenant? of Lord Seaforth; See Ent. Trans. Haw. Lep. Brit. Mr. Haworth's letter	332 Preface 1	Lord Seaforth's	-	-	1	Prof. Hooker saw it, and told me he suspected it came from Norway to Lewis.

♂, Male; ♀, Female; T. Total of species known as British.

* Found as early as April in France.

† Same time as *Argynnis Paphia*; and Mr. Wailes, in letter 2, says the two specimens were wrapped in paper.

‡ J. C. Dale bought his insects in 1817.

§ Seen (?) also Sept. 20. 1819, Richmond Park, Surrey, and Oct. 11. (?) 1820, by B. Standish, in letter 11 to me.

‖ Mr. Miller, A.L.S., and Curator of the Bristol Institution, died very lately.

¶ Donovan says, " said to be found in Scotland."

Name.	Date of Capture.	Initials.	Habitat and Locality.	County.	P.k.	Captor or Authority.	P. or let.	Cabinet.	♂	♀	T	Whence obtained, &c.
Hippárchia Ligèa	Aug. m.	A. M'L.	Isle of Arran	Buteshire	S.	A. M'Leay, Esq.	—	Mr. M'Leay's	-	-	1	
	—	P. W.	Near Brodick Castle	—	-	Sir P. Walker	—	Mr. Donovan's	-	-	1	Sir P. Walker.
	—	P. W.	—	—		Sir P. Walker	—	Mr. Stephens's	1	1	2	Sir P. Walker.
Blandìna	July b ?	J. C. D.	Isle of Arran	Buteshire	S.	J. C. Dale, &c.	—	British Museum, &c.	4	4		
	—	—	Cairndow, near Inverary	Argylesh.	-	Rev. T. W. Bree						
	—	—	Lackard	Perthshre								
	e. 1825	J. C. D.	Loch Katrine	Perthshre								
	Aug. b.	—	Near Loch Awe	Argylesh.								
	m.	—	Near Edinburgh	Lothian	-	J. Wilson, Esq.						
	—	—	Castle Eden Dene *	Durham	E.	J. Backhouse, Esq. &c.						
Mnéstra	—	—	—	—	-	Dr. Letsom ?	—	British Museum, doubtful drawer †	1?	-	1	Dr. Leach, from Mus. of Dr. Letsom.
Cassìope	June 11. 1809	T. S.	Near Ambleside	Westmor.	-	T. Stothard, Esq. R.A.	—	British Museum, &c.	4	-	-	1 from Mr. Stothard, 3 from J. C. Dale.
	e. 1826	J. C. D.				J. C. Dale.	—	J. C. Dale's, &c.	4	2		
	July	J. C.				J. Curtis, Esq., &c.						
	Aug. b. 1827	T. M.	Sty-head	Cumberld.	-	T. Marshal, Esq.						
	—	R. W.	Little Langdale	Cumberld.	-	R. Weaver						
Hèro	June? 1804?	? P.	Ashdown Forest	Sussex	-	— Plastead, Esq.	—	Mr. Curtis's	.	1	-	Mus. Plast.
Ascànius	June? 1804?	? P.	Ashdown Forest ?	Sussex	-	— Plastead, Esq.	—	Mr. Curtis's	1	-	-	Mus. Plast.
Thècla prùni	June e. 1829	J. S.	Monkswood, near Sawtry (Not in Suffolk or Yorksh.)	Hunts	-	Mr. Seaman	—	Mus. Brit. &c. &c.	2	2		
	July b. 1828	C. C. B.				C. Babington, Esq.						
	—	W. L. G				Rev. W. Garnons.						
Lycæ̀na Chrysèis	—	—	—	—	-	Mr. Merret ?						
	August, 1804 ?	? P.	Ashdown Forest	Sussex	-	— Plastead, Esq.	—	Mr. Curtis's, &c.	1	1	-	Mus. Plast.
	♂ July 24. 1815 ?	Dr. L. ?	Epping Forest, near Woodside	Essex	-	——— ? a friend of Dr. Leach	—	Mus. Brit.	3	2	-	Dr. Leach.
L. Virgaúreæ	August	—	Isle of Ely	Cambridg.	-	——— ? Lewin's Ins.	—	Mus. Brit.	3	1	-	Dr. Leach.
	1793 ?	W. L.	Marshes	Hunts	-	——— ? Seen by Mr. Lewin	—	Mr. Curtis's, &c.	1	1	-	Mus. Plast.
Arìon	June e.	F. O. M.	Charmouth	Dorsetsh.	-	F. O. Morris, Esq.	—	British Museum, &c.	3	3		
	July b.	C. A.	Near Bedford	Bedfordsh	-	Dr. Abbot and J. C. Dale						
	m. 1818	J. C. D.										
	—	—	Near Dover	Kent								
	—	—	Marlborough Downs	Wiltshire	-	Lewin's Pap.						
	—	—	Near Bath	Somerset.	-	Lewin's Pap.						
	—	—	Bramble blossoms	—	N.W.	Jermyn's Vade Mecum.						

* Devonshire? Dr. Leach.

† Put in the drawer of doubtful British natives.

Art. VIII. *An Introduction to the Natural History of Molluscous Animals.* In a Series of Letters. By G. J.

Letter 5. *On the Forms, Composition, and Structure of Shells.*

Sir,

Molluscous animals, in one point of view, may be divided into two classes; those, viz., which have, and those which have not, a shell to cover and protect the body. The latter are said to be *naked*, and the former *testaceous* Mollúsca; but however discriminative and important the character which separates them may at first appear, it is really, in a systematic view, one of trivial consequence, and perfectly arbitrary. In several testaceous species the shell is too small to contain the body of the animal, while many of the naked tribes possess a shell which, however, is concealed under the folds of the skin, and is protective only of the internal viscera. The system which separates and places in distinct orders the naked slug and the shelled snail must be artificial; and if for the present I adopt the distinction, it is because I now wish to give you some account of the structure of shells, and of the manner of their formation; for I would not that you should be familiar with their varied forms, and yet be ignorant of the mode in which they are constructed.

Conchologists arrange shells under three orders, the *multivalve*, *bivalve*, and *univalve*; or, to reverse the series, into shells composed of one, two, or more than two, pieces.

After removing such species as belong to animals [*] of a different category, there remain very few multivalve shells. These have their valves connected by a soft coriaceous membrane, and they are laid, in an imbricated manner, along the back of the animal, which, in general outline, resembles a wood-louse. They constitute the genus Chìton of Linnæus. (*fig.* 86.)

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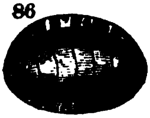

The bivalves are very numerous, and belong exclusively [†] to a distinct order of molluscous animals. These shells are formed in general of two pieces only, placed in apposition, equal or nearly so in size, and commonly alike in form. The pieces or valves are connected at their beaks by an elastic ligament of a peculiar structure, which forms a hinge on which the valves open and shut. In a few instances there is no hinge of this sort; but a bivalve shell is so peculiar that you can seldom be at a loss where to place it, even at first sight. Thus, you will certainly not place the Phólades amongst multivalves, as the mere conchologist has done, because it has a few additional pieces placed over and above the hinge; for the habit of these shells is that of bivalves, and the little accessory pieces have no character of proper valves. The only shells which can perplex you are those which Lamarck has placed in a family denominated Tubícolæ, from the circumstance of the animals forming a calcareous tube for their protection, and which tube, until the French naturalist explained its true nature, had been considered as the shell itself. To this family belong the *T*erèdo, of which we have had occasion to say so much, and the Aspergíllum or water-pot shell, perhaps the most singular of its class. These are truly bivalves, but the proper valves are small, and their existence was not recognised until lately, when naturalists, not satisfied with observing and admiring external characters, began to examine with attention internal structure. In Aspergíllum (*fig.* 87.), the part generally preserved in collections is the tube, to the inside of which, near its lower extremity, the valves are closely soldered: but in *T*erèdo the true shell is placed without the tube at the posterior extremity. The valves are small, and somewhat anomalous in form, while the tube is long, flexuose, and worm-like, and lines the bore which the creature has made in the wood.*

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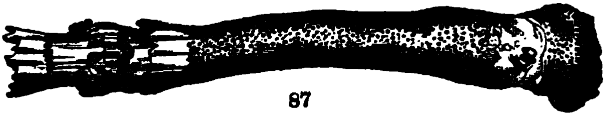
[*] We do not include the Cirrípedes (*Lèpas Lin.*) amongst the Mollúsca.

[†] So at least says Lamarck; but the shells of some Entomóstraca appear to be true bivalves.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It is unnecessary in this place to describe the various forms which bivalves assume, and on which their distribution into families and genera is founded. That will be done in a future letter. I wish merely further to observe, that, in relation to their structure, they may be divided into the compact and foliated. The former are heavy, hard, uniform throughout, and have a clean fracture; while the latter are light, divisible into layers, and break into irregular splints. The oysters and the genera allied to them exhibit this latter structure in the clearest manner, the pectens and muscles, both fresh-water and marine, less so; and, if you will compare any of these with a species of Máctra or Vènu*s* Lin., you will at once have an accurate notion of what is a foliated and what a compact shell.

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* See the figure at p. 23. fig. 7. *b* of Vol. II.

Univalves are still more numerous than bivalves, and more diversified and beautiful in their forms and colouring. Some are simply conical (Patélla *Lin.*), either entire or perforated on the summit, or slit at the margin; some are tube-like (Dentàlium); some bear a similitude to the human ear (Haliòtis *Lin.*); but by far the greater number are spiral, the whorls being contorted in a thousand pleasing ways. Thus the Planórbis and some others have them rolled upon one another without being raised, so that the last whorl is on the outside, and forms the margin. These flattened shells are said to be discoid. In Hèlix, *N*erìta, and Dòlium, the last whorl is so disproportionally large to those which constitute the spire, that the shell assumes a globular shape; in *T*ròchus it is a regular pyramid; in Térebra and Turritélla the whorls are so numerous and elongated that the shell resembles a turret, and is hence said to be turreted or turriculate. But between these extremes there are many intermediate forms, and the spire in general is a more or less acute oblique cone, tapered from the base, or with its greatest diameter towards the middle. There is, however, a large and beautiful tribe of univalve shells, which are denominated convolute; for the whorls, which are small segments of large circles, are wrapped round the pillar, and, the one rising a little above the other, embrace or enclose the preceding ones. Hence it results, that the aperture of a convolute shell must be parallel to its length. The cowries (Cypr*æ̀a*), volutes, and cones are examples of this kind of formation, and in elegance of form and brilliancy of colouring they exceed all others of the class. The *N*aútilus and Argonaúta are, on the contrary, revolute shells; that is to say, their whorls are twisted backwards into a spire, which is contained within the outer whorl. *

Revolute shells, in common with many discoid ones, differ in a very remarkable character from other univalves; for their cavity is divided by transverse partitions, more or less complete, into many chambers; and hence they are called chambered, or, more commonly, multilocular, shells. The recent shells of this description are few in species, nor are the species very numerous in individuals; but the fossil kinds are many and abundant, and some of them have been of a size so great that they were not unworthy to play their part with the crocodiles, the Ichthyosaúri and Plesiosaúri of a former world.

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* The reader will find these forms delineated in some beautiful cuts which illustrate a paper signed Conchilla, in Vol. I. p. 25. et seq.

What are vulgarly called Córnua Ammòn*is* are fossil multilocular shells, and their preservation is so complete, that, from these remains, we can form some tolerably plausible notions of what has been the structure and habits of their animals.

Further, the inmates of many univalves can close the aperture of their shells with a horny or calcareous plug attached to the dorsal part of the foot, and termed the operculum. These are said to be operculated, while those which have no protection of this sort are non-operculated shells. The former, in the opinion of some naturalists, are the links which connect the univalves to bivalves, the operculum being considered analogous to the second valve, and Blainville indeed goes so far as to call them sub-bivalves.* This is surely straining analogies, and seeking them in things between which there is no mutual resemblance; but in fact the opinion is a part of a theory relative to the mutation of one organ into another, which has been brought forward and illustrated at great length by some French physiologists, and too hastily adopted by some of our own countrymen. We will probably have a future opportunity of discussing this doctrine, which, I may here remark, appears to be the offspring of metaphysical subtlety, and as likely to lead to error in regard to the functions of parts, as to guide us to a knowledge of their true uses.

To return from this digression, I remark that univalve shells are again distinguished into such as have the margin of the aperture entire, and into such as have it notched, channelled, or more or less lengthened into a canal. The latter are said to be canaliculate, or emarginate, or effuse, and, as will be afterwards shown, differ from the first in the habits of their animals, so that the character is of greater importance than is at first obvious. These distinctions and terms it is necessary to remember, as I shall have frequent occasion to use them in our future correspondence.

However varied in external character, shells differ very little in their chemical composition. They all consist of carbonate of lime united to a soft albuminous matter, and any variation that occurs in different shells is merely in the relative proportions of these constituent parts.[*] Mr. Hatchett, to whom we are indebted for all our correct information on this subject, has divided shells into two classes, according to the proportion and state of their animal matter. The first class he names Porcellaneous Shells, since they resemble porcelain, are usually of a compact texture, and have an enamelled surface, which is often finely variegated. The convolute shells afford good examples of this class. They consist of carbonate of lime, cemented together by so small a portion of albumen, that, when immersed in a dilute acid, the shell is completely dissolved, and not a sensible trace of it left behind. "The shells belonging to the second class are usually covered with a strong epidermis, below which lies the shell in layers, and composed entirely of the substance well known by the name of mother-of-pearl. They have been distinguished by the name of Mother-of-pearl Shells." The fresh-water muscles, the oysters, the Haliòtis, and pearly Túrbines are examples of this class. "When immersed in acids they effervesce, at first strongly, but gradually more and more feebly, till at last the emission of air-bubbles is scarcely perceptible. The acids take up only lime, and leave a number of thin membranous substances, which still retain the form of the shell." These membranes have the properties of coagulated albumen.[†] But the distinction between these two classes holds good only in extreme cases; for there are many shells which are intermediate, and stand on debatable ground. The compact bivalves dissolve in the menstruum entirely, as does also the common whelk (*Búccinum* undàtum), but they are not properly porcellaneous; while the various land snails leave an insoluble membrane, though they are not perlaceous shells.

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* Manuel de Malacologie et de Conchiliologie, p. 229. In another place, however, he more correctly observes, " Quelques auteurs, et entre autres Adanson, l'ont regardée comme l'analogue d'une des valves d'une coquille bivalve, mais évidemment à tort; car sa position, par rapport au corps de l'animal, n'indique aucune analogie," &c. (p. 103.) [" Some authors, and amongst others Adanson, have regarded it as the analogue of one of the valves of a bivalve shell, but evidently wrongly; for its position with relation to the body of the animal does not indicate any analogy."]

Whence doth the animal borrow these materials, and in what manner doth it apply them to rear up its mansion well fashioned in every part? To the first question, I believe, no satisfactory answer can be given. Some physiologists indeed have analysed the food, and have summed up its constituent item of lime, and there find the earthy material of the shell. But the quantity of lime which the animal takes in this way seems trifling when compared with what is required, and which it actually excretes. I know that, in favour of the opinion I combat, it has been asserted that the edible snail (Hèlix pomàtia), which under ordinary circumstances forms a calcareous operculum previously to hybernation, is unable to make any thing more than a membranous substitute "when deprived of nourishment;" and that the snail itself thrives better, and is found in greater numbers, in chalky districts than elsewhere. This may all be true, and yet it proves little; for we are far from denying that the food is the source of the lime; and that lime is not necessary to be eaten in order to the perfect formation of the operculum is proved, as Mr. Bell remarks, by many snails in his possession having formed that part, though during the whole summer they had no access to any preparation of lime.* And, further, sea-water and sea-weed contain a mere fraction of calcareous matter; yet what and how many large and compact shells are produced by creatures which have no other sustenance! I repeat, then, that though the food unquestionably is the source of the material of shells, yet has the architect as certainly the power of changing its constituent principles, and of altering their qualities.

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[*] Raspail and Prevost have found that bivalve shells in the first periods of their growth consist wholly, or nearly so, of phosphate of lime, a discovery as inexplicable as it was unexpected.

[†] Thomson's Chemistry, v. p. 554–5. Edinburgh, 1807.

The mode in which the shell is built is less a mystery; so that the second question admits a more satisfactory answer. If you will examine the snail of any common Hèlix, you will perceive that where the body rises into the shell there is a fold or membrane of a semicircular shape. This part is denominated the *collar*, from the manner in which it surrounds the body, and it is the organ which secretes the shell. The animal is born with the rudiments of its future covering, and by its gradual increase of growth is enabled to push the collar for a space, and from time to time, beyond the original margin. In these operations a thin layer of membranous and calcareous matter is excreted and deposited, which is gradually thickened by successive layers being laid on within the first by the repeated protrusions and retractions of the collar. This portion being formed, the animal commences another, and finishes it in the same manner; and the extent of each portion is marked in some shells by an elevated rib, in others by a slight depression. There is not, as the language of some authors would seem to imply, a regular and alternate deposition of a layer of membrane and a layer of lime; but in all shells the animal and earthy matters are obviously secreted and deposited at the same moment and in commixture. And although it be true that the exterior or smallest layers are formed first, and that others are successively deposited subjacent to them, yet it does not follow, as is commonly stated, that each new layer is complete, and extends beyond the margin of the former one, so that the shell, by every addition, increases in thickness and circumference. This, we feel persuaded, is not the case; and is disproved by the examination of every univalve, and not supported by the structure of any bivalve. The first-formed whorls of the former are not thicker, not even in fact so thick, as the ultimate ones are; nor do any bivalves, so far as we are aware, gradually thicken from the beak to the margin. The layers are only partial formations, and do not extend beyond the points to which the animal can protrude or retract the collar or the margins of the cloak.

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* Zoological Journal, i. 96–7.

Bivalve shells are formed in precisely the same way as univalves; but here the margins of the cloak or mantle which embraces the body of the animal on each side perform the functions of the collar.

You will have observed that the inner surface of all shells is very smooth, and apparently denser and harder than the outer. It appears that the Mollúsca, to form this inner layer, excrete the lime in a nearly pure state, that is to say, mixed with much less animal matter, so that in concreting the particles become very close and compact, and receive a polish from the repeated frictions of the soft parts. This structure is very brittle, and hence is called *vitreous*. It is often used to strengthen and finish the apertures of univalves, as is very remarkable in the helmet shells (Cássis *Lamarck*). The upper part of the spire of some turreted shells are filled with the same matter at a late period of the animal's life, and, becoming dry and brittle, it is readily broken off, giving rise to what are called *decollated* shells. The particles which divide multilocular shells into several chambers are likewise vitreous, and seem to be formed by a deposition from the posterior part of the inhabitant at stated periods in its growth, the periods being regulated by a law of its original constitution.

In a great number of Mollúsca it would appear that the increase of the shell from birth to mature size is uninterruptedly progressive; but there are, perhaps, an equal number, in which the animal, at certain and determined intervals, forms a transverse rib or varix, and seems to become for a season inoperative. These ribs vary much in their numbers, in their figure, and in the distances at which they are placed in different shells, but in the same species are alike and uniform, so that it would perhaps be better at once to refer their formation to a law of their individual life imprinted on them by their Creator, than to seek for its explanation in causes which are only partially applicable, or of doubtful existence. We may suppose, indeed, with Blainville, that, during the season of love, the derivation of fluid and of energy to the generative system may diminish the secretion of fluid and of lime from the cloak, and that then the growth of the shell goes on as usual, as is indicated by the plain intermediate spaces. We may further suppose, that, when the seminal turgescence has subsided, the fluids are carried in greater abundance to the skin, whence an accumulation of calcareous matter in the margins of the collar, and a consequent varix or rib. We may make such or similar suppositions, but they are idle and improbable; and I mention the hypothesis rather from respect to its able author than from any the slightest conviction of its truth. It is inconsistent with analogy to believe that the Mollúsca are influenced by the sexual passion ere they have attained maturity, yet the hypothesis supposes that some of them feel its power almost from the date of their birth, and afterwards at very short and frequent intervals; while others, of the same genus even, are swayed by it at distant periods, and only two or three times during the term of their existence. And in what predicament are those which are plain and ribless? Are we to believe that their life is love unceasing; or that it ceases only as the animal reaches maturity, and is about to finish the aperture of its edifice?

A theory of the formation of shells different from that just explained was once maintained by many naturalists, and amongst others by Klein and Bonnet, men of great learning and celebrity. They said, that the full-grown shell was a mere evolution of the fœtal one, from the addition of matter by intusception; and they supported the theory by the observation, that the shell yet unborn has as many whorls as the adult. The observation is contrary to fact*; and it is now generally admitted that the collar secretes the material of the building. "It is found to contain in its glands or vessels the carbonate of lime in a free state; so that, when the surface of the collar is touched by any foreign body, at each point of contact a quantity of it is thrown out mixed with a tenacious mucilage. To be still further convinced of the fact," says M. Gaspard, in an interesting essay on the physiology of the Hèlix pomàtia, "I cut off the collar of the mantle, and having thrown it into a dilute acid, a quantity of gas was given off, and the liquid gave the usual white precipitate with the addition of soda. No other structure similarly treated afforded the same results." † Further, if we drill a hole in the shell, the animal fills it up, not by any secretion from the adjacent portion of skin, but by withdrawing the collar as far as may be necessary; and in passing it repeatedly over the hole, leaves a layer of calcareous matter each time, until the new piece has acquired the requisite thickness. I will not deny that other parts may occasionally secrete shell. The operculum, in the tribes furnished with it, is certainly secreted by the part to which it is attached; and the skin investing the body appears to furnish the material required for the formation of the septa of multilocular shells, and the tubes of the Tubícolæ.

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* See the admirable preface to Muller's *Història Vérmium*, vol. ii. p. xxi. and xxiv.

† Zoological Journal, i. 96.

The shell is to be considered as a model of the body of its architect; so that, when we observe two shells to differ remarkably in their figure, we may infer, with perfect safety, that the animals differed no less; and it is this agreement between the living snail and its dead envelope which gives to the study of the latter an importance it could not otherwise possess. Even the various processes, foliations, and spines, which vary and ornament the outer surface of shells, are the result of similar variations in the collar. "The form of the shell," I translate the words of Blainville, "and even the predominance of the animal matter over the earthy, bear a relation to the form of the skin or of the cloak, and to the age of the snail. Thus, the tubular, spinous, and lamellated elongations, which occur so frequently on the outer surface, are the consequences merely of prolongations, lobes, and fringes of the cloak; and the notches and channels of the aperture are also produced by the habitual though intermittent protrusion of some organ, as of the respiratory tube, or of the head, or of the oviduct, &c." *

When, however, we come to apply the above general doctrine of the formation of shells to particular cases, we meet with some apparent exceptions. The cowries (Cypr*æ̀a*), for example, by an addition of matter to the edges of their lips, would soon have the aperture entirely closed, as you will perceive on examining any species of that genus. To get rid of this difficulty, Bruguière and others have imagined that the animal threw off the shell when it had become too small for his necessities, and then formed another more capacious, and better fitted for his ease. This theory labours under insurmountable difficulty, nor does it seem required by the circumstances of the case. The Cypr*æ̀æ*, in their immature state, have a very different form from that they have when full grown. When young, they are very thin and brittle, with an evident spire, and a wide aperture, the margins of which are not toothed and inflected, but plain and effuse. (*fig.* 88.) They are then, in fact, convolute shells of the ordinary character, and are obviously enlarged, like all others, by the addition of matter to the outer lip alone. But maturity brings with it a change in the organs of the animal. The lobes of its cloak become more developed, and ultimately very large; so that, one issuing from each side of the aperture, they can cover the shell, and meet in the centre of the back. These lobes are secretory organs, and pour out an abundance of lime in a vitreous state; and by their motions spreading it over the outer surface the shell is thickened, and assumes a form totally different from its primary one, and dependent on the new developement of the soft parts.

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* Manuel de Malacologie, p. 94. — I may here, once for all, acknowledge the great assistance I have received from this work, in the compilation of this Letter.

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The Cypr*æ`æ* are not the only mollusca which acquire a superior developement at maturity; but it is common, in a greater or less degree, to many of them. At this period, many land and marine Mollúsca strengthen the lips of their shell with an external or internal rib: others modify and contract it with a deposition of vitreous lime; and others, again, enlarge it by the addition of parts of which there was no previous trace. Thus, the Strombùsidæ (Strómbus *Lin.*) resemble a cone in their young state, and have no dilated and spinous lip, so remarkably characteristic of their perfect shells. Here we must suppose that, about this period, the lateral lobe of the cloak is enlarged and otherwise changed, in accordance with the digitations of the lip.

It is here necessary to take some notice of an opinion, which, though not, perhaps, originally proposed by him, has of late been much insisted on by Mr. G. B. Sowerby, a naturalist who has paid particular attention to conchology, and whose work *, from which I am about to quote, you will find very useful in your future studies. He tells us that the animal of the cowries, of the cones, and of some other genera, has the capability of dissolving and reabsorbing the calcareous matter of one part of the shell, and of again depositing it in places where additional strength or size is required by the change of form which accompanies the progress towards maturity. Thus he accounts for the fact that " young cowries which have formed their involute outer lip, are generally larger than when they are full grown and have completed their shell;"* and thus it happens, that, in cones, the "inner concealed volutions" are "exceedingly thin," while "the outer or exposed parts are comparatively thick and strong." So, likewise, the transverse spinous ridges which thicken and protect the external lip of the *Mùrices*, or rock shells, are removed, probably by a solvent liquor;" for otherwise, he adds, "it is obvious that these murications or spines must be in the way of the future increase of the shells." Let us for a moment admit this hypothesis, and trace the consequences. It *supposes* the existence of a solvent liquor, and of a glandular apparatus fitted for its secretion; it *supposes* that this gland is in action only at particular seasons, and then only for a very limited time, after which it good-naturedly remains quiescent; it *supposes* that the living flesh of the creature is insensible to the burning of this acid, which, it further *supposes*, is so equally and carefully applied, that the inner volutions are worn only "exceedingly thin," but in no place perforated or destroyed; and so much only of the spinous lip of the *Mùrex* dissolved that the spines fall off, and leave the part smooth and even, a state in which an acid never left a part before. It *supposes* (and this is a startling supposition) that the snail swallows the redissolved lime charged with all its solvent liquor, which, it would seem, passes through the body to reach the excreting organs, and be again deposited. Or, if the supposition is not to be admitted, by what organs, I ask, is the liquid lime prevented from being washed away; and by what organs is it purified of the acid, and again spread out and solidified? A hypothesis which requires so many and such strange suppositions for its support cannot for a moment be entertained. It "is itself so exceedingly absurd," to use Mr. Sowerby's own words, when combating the less unreasonable doctrine of a celebrated naturalist, "that we could have wished, for the credit of science, that it had never disgraced the pages of any books on natural history:" and if any other explanation than what we have given is required to explain the facts, it must be sought for in a more perfect knowledge of the structure of the animals.

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* Genera of Recent and Fossil Shells.

Let me now direct your attention to the colouring of shells. The shell is rarely coloured throughout. The interior layers are commonly white; the internal surface is sometimes partially coloured, the external one almost always.

The fine iridescence of the internal surface of many univalves and bivalves is not owing to any colouring matter, but, as the experiments of Dr. Brewster have proved, to the mechanical disposition of the component particles. This surface, however, is, besides, often tainted yellow, red, or brown; and these spots probably derive their colour from being near to, or in contact with, an organ which secretes a coloured fluid. Thus the yellow or brown spots observable in some univalves are produced, according to Blainville, by the proximity of the liver; and the shell of the Jánthina is stained of a uniform blue by the excrementitious fluid of the animal.

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* This remark seems to have been made, in the first instance, by Mr. Burrows, in his *Elements of Conchology*, p. 95. The fact is very singular, but I do not see exactly how it bears on the question at issue.

The painting of the external surface is in general superficial, and its tracing is dependent on the arrangement of the glands which secrete the colouring matter, and which are situated on the margins of the cloak or collar. If you examine a banded snail, you will perceive as many coloured spots on the edge of the collar as there are zones on the shell; and if a part of the margin of the shell be cut away, the piece reproduced is brown opposite to the dark portion of the collar, but in other parts yellow. In those cases where the colours are disposed in continuous bands, there is no difficulty in understanding the mode of their formation; but no experiments or observations yet enable us to explain how some are painted in spots disposed in every varied form, some in lines and spots intermixed, and some in bands placed at intervals in the direction of the striæ of growth. What Reaumur and Bosc have said on the subject is so entirely hypothetical, that it is unnecessary to repeat it. You can, I doubt not, create for yourself a theory which shall be as satisfactory as theirs; but, remember, it is not worth the trouble, unless it is based on experiment.

Beneath the superficial and visible colouring of the full-grown cowries, and of some olives, there is concealed a deeper painting, different from the first both in colour and in character. This is accounted for when we remember the peculiar manner in which these shells are perfected. The first thin shell is coloured like other shells, and in the same manner from the margins of the cloak; but when the dilated cutaneous lobes of the animal have attained their full size, and deposit the highly polished testaceous coat which strengthens the shell, they deposit at the same time a colouring matter which always assumes a form different from the first; the painting deriving its peculiar character from the manner in which the colouring glands are arranged in the lobes.

The colour of shells is a good deal influenced by the operation of light; so much so, that, in general, the liveliness of the one bears some proportion to the intensity of the other. How varied, vivid, and beautiful are the testaceous Mollúsca of tropical seas and of tropical climes! How sober and subdued are those which inhabit our northern shores! The terrestrial Hélices, being most exposed to the operation of light, vary most in their colours; while those shells which are concealed within the bodies of their snails are always white, as are also those which live in holes whence they never issue. Another striking proof of the blanching effect of darkness is furnished by some bivalve shells permanently affixed by their lower valve, which is constantly white, while the upper one may possibly be variegated with bright colours. The spondyli, and a number of pectens, afford examples of this contrast between their valves. Olivi has further remarked, that the shells which are enveloped in sponges, or other foreign bodies, or which burrow in sand, or even which live in constantly shaded places, are much paler than those which crawl about unprotected from the light; and even the exposed parts of the same shell are more highly coloured than the parts which are shaded.

There is only one other part which remains to be noticed in this letter. This is the *epidermis*, or what the French call the *drap marine*. It is a dry horn-coloured membrane, of greater or less thickness, generally smooth, but sometimes rough, or even shaggy, which covers the external surface of most shells; though many, particularly those of the convolute kind, do not possess it. Some difference of opinion exists as to its nature. Blainville supposes that it is the true epidermis or scarf-skin of the animal, raised from its position by the deposition of the shell underneath it; and this opinion, we believe, is generally entertained as correct by the French naturalists. It seems inconsistent, however, with the doctrine of the formation of shells explained above, and cannot, therefore, be adopted by us. Mr. Gray, who calls this membrane the Perióstraca, it appears to me, has given its true theory. He says, "From attentive examination, I am inclined to believe that the periostraca is formed by the outer edges of the plates of animal matter (which has no cretaceous matter deposited in it, or only a very small quantity) being soldered together, and forming a kind of external coat."* It is, in fact, a dried sheet of coagulated albumen effused at the same time, or, perhaps, even prior to the first layer; and may be of use to protect the subjacent and more cretaceous layers from the action of the air or water during their consolidation.

To conclude. When a shell has attained its full growth, the changes which the animal further effects are almost limited to some increase of its thickness; not, however, by the addition of any new layers, but by the effusion of vitreous matter. Hence holes and canals, previously visible, are now filled up; the aperture contracted, and the margins strengthened and enlarged; the upper part of the spire, perhaps, filled and made solid; and the peculiarities which distinguish the sexes of the diœcious species fully developed. Foreign agents now begin to act, and the external layers lose their hair-like coating or their epidermis; the colours become paler, and ultimately disappear; striæ and tubercles are smoothed and worn down; and parasites deform and perforate the outer surface. Death at length overtakes the architect, and the shell decays under the influences of the water and of the air.

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* See his very interesting Conchological Observations, in the first volume of the *Zoological Journal*, p. 216.

Such, then, is the manner in which shells are formed, so beautifully painted, and so curiously fashioned. They are the house and strong hold of their proprietors, to whose existence, amid the strife of elements, and the wiles and voracity of their foes, they seem essentially necessary. The shells of the marine tribes, as was fit, are in general of great strength and hardness; or, if defective in these qualities, their weakness, through the appliance of other means, is made strength. The river kinds are less hard, and thinner, being less exposed to the danger of a stormy element and a rocky bottom; while the shells of land snails are both light and thin, yet completely impervious either to moisture or air. There is much to admire in all this: in the fitness of the shell to its element, in the art displayed in the building, and in the painting of the edifice, there is much to admire; and yet the possessor crawls on, unconscious of all, admiring nought. Wherefore, then, this profusion of beauty? Surely the Creator hath pleasure in his works; surely Epictetus speaks the language of reason when he says, " God hath introduced man into the world to be the spectator of his works, and of their divine Author; and not to be the spectator only, but to be the announcer and interpreter of the wonders which he sees and adores."

I am, Sir, &c. G. J.

Art. IX. *On the* Hydra, *or Fresh-water Polypus.* By Samuel Woodward, Esq.

Sir,

I am not aware that the subject of the *Hydra*, or fresh-water polypus, has been particularly noticed since the elaborate treatise published by Henry Baker, Esq. F.R.S., in 1743; and, that work having become scarce, a few remarks may be interesting to your readers.

Having, from time to time, collected these animals from the ditches intersecting the meadows in the Cathedral Precinct here, I am desirous that you should record the locality, and, at the same time, direct the attention of naturalists to these interesting objects. For the purpose of ascertaining if they had resumed their summer station, I visited the spot on the 20th of May; and, in a six-ounce vial of the water (from just beneath the surface) and duckweed which I collected, I found no less than twelve animals, eight of which were of the green kind, *Hýdra* víridis *Lin.* (*fig.* 89. *a*, twice the natural size), and four pink-coloured (*b*), noticed by Mr. Baker, at p. 20. of his natural history of these animals. The green species were from 1 to 2 lines in length; the pink would stretch themselves to nearly 4 lines, and were much the largest animals. On the 23d of this month they began to bud (as at *c*); and on the 24th, young animals, in different stages of growth, were to be seen extending their slender arms from nearly all the specimens: in some instances one, and in others two, were seen attached to the parent stem (*d e*). I observed, in several of the young animals, only five arms, which arose from the remaining two not being developed.

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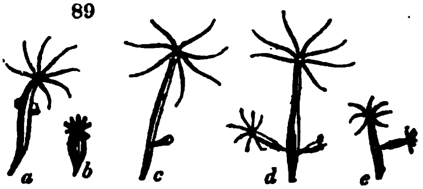

Mr. William Anderson, F.R.S., to whom Mr. Baker acknowledges himself under great obligations for his assistance in his second treatise on the microscope, paid great attention to these animals, and collected them from the ditches around Norwich; and from his manuscript journal, in my possession, it appears that the principal locality was a ditch in Spring Garden, situate about a quarter of a mile south of the place where I collected mine. * He remarks that he has never found any before the beginning of May, or later than August. Of their food, he observes that he found the small white worm, inhabiting the mud of our channels, to be more acceptable. Mr. Baker fed his upon the small red earth-worm.

It would, perhaps, be superfluous in me to make any further remarks, so much having been said by Mr. Baker, to whose interesting work I beg to refer your readers.

I am, Sir, &c.

SAMUEL WOODWARD.

Dian's Square, Norwich, May 25. 1829.

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* The *Hýdra* fúsca may be found in the pond by the Red House, at Battersea, as large as Mr. Woodward's drawings of *H.* víridis.—*J. D. C. S.*

ART. X. *An Introductory View of the Linnean System of Plants.* By Miss KENT, Authoress of *Flòra Doméstica*, *Sylvan Sketches*, &c.

(*Concluded from* p. 142.)

My dear Reader,

I HAVE now but a very short time to spend with you, and yet have much to say. Under such circumstances, people are seldom very pleasant companions: they talk too hastily to be very clearly intelligible, and fatigue both their hearers and themselves to little purpose. There is, however, this advantage in epistolary companionship, that the parties may take their leave, even in the midst of a sentence, without any breach of politeness.

The ninth class, *Enneándria*, is a very small one, containing three orders. In the first, *Monogýnia*, we have no British plants; its chief wealth consists of the fine exotic genus *Laúrus*, which comprehends many handsome and valuable species: the camphor, cinnamon, and sassafras trees, the poet's laurel, the alligator-pear, and some excellent timber trees. The cashew-nut, Anacárdium (from two Greek words signifying heart-shaped) occidentàle, also belonging to this order, is a handsome Indian tree, producing fine evergreen leaves; fragrant flowers; an edible pear-shaped fruit, from the end of which the nut protrudes; a caustic oil, applied to various uses; a gum; and a natural ink for marking linen. In the second order, *Trigýnia*, is rhubarb, *R*hèum (from Rha, the ancient name of the river Volga). The roots of several of the species are used medicinally, and their leaf-stalks for the table. In the third order, *Hexagýnia*, we have one British species, the flowering rush, Bùtomus umbellàtus, a tall aquatic plant, producing large umbels of handsome flowers, with six rose-coloured petals, and as many pistils of a deeper red, hexagonally disposed. The leaves are nearly 3 ft. long, and have three sharp angles, which, wounding the mouths of cattle feeding upon the plant, have obtained for it the name of Bùtomus, from two Greek words, signifying an ox, and to cut.

The tenth class, *Decándria*, has five orders. In the first, *Monogýnia*, we find the beautiful evergreen called the strawberry tree, *A*'rbutus *U*nèdo *, which displays its delicate fruit and flowers in the dreariest months of the year, and is elegant and ornamental at all seasons. It grows wild near the Lake of Killarney, in Ireland; but is by many persons supposed to have been originally introduced from the south of Europe. The two other species included in the British Flora are trailing shrubs, growing on mountainous heaths. Another elegant genus of evergreens, very nearly related to the *A'*rbutus, is the Andrómed*a*, so called by Linnæus, from the fair lady of that name, who was exposed to the fury of sea-monsters, and rescued by Perseus. We have one British species, mentioned by Linnæus in that delightful work, his *Tour in Lapland.* The exotic species are numerous. Rivalling these in elegance of growth is the genus wintergreen (Pýrola), of which we have several British species growing in the woods of Scotland and the north of England. Among the more important productions of this order are, the logwood of commerce, the Brazil wood of the dyers, lignum vitæ, mahogany, the balsam of capevi, and the quassia bark, so named in memory of the negro slave Quassi, who first discovered its valuable properties. A very remarkable plant is Venus's fly-trap (Dionæ`*a* muscípula), which, from the form and irritability of the leaves at their extremity, entraps small insects. Among the more ornamental plants generally cultivated in England are the rhododendrons, kalmias, and andromedas. In the second order, *Digýnia*, are placed the Hydrángea (from two Greek words, signifying water and vessel, on account of the great quantity of water it consumes), the pink (Diánthus, from the Greek, signifying God's flower, on account of its superior beauty); and the saxifrage, of which that delicate little plant called London Pride, so well known as thriving even in the smoke of cities, is a species. Another native species, *S.* granulàta, affords to the young botanist an example of the granulated root; in which a number of small solid knobs are connected by fibres. (*fig.* 90.)

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* The word Arbutus has been derived from the Celtic *ar-boise*, austere bush; in reference to the roughness of the fruit. In the same manner, Pliny's appellation, *U*nèdo (signifying, I eat one) is supposed to express that naturalist's opinion of the fruit; but surely neither name can be considered as justly applying to this tree strawberry, which, however some may call it insipid, can never deserve a harsher epithet. They might be better bestowed on the red bear-berry, *A*. Uva-úrsi.

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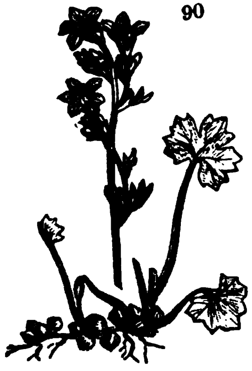

A handsome and fragrant native plant of this order is the soapwort (Saponària officinàlis), so called from the cleansing properties of the sap. The other orders are chiefly composed of plants of inferior note.

In the next three classes we are to consider not only the number of stamens, but their insertion. The eleventh class, *Dodecándria*, includes plants of which the flowers have from eleven to twenty stamens, affixed to the receptacle. The twelfth class, *Icosándria*, has twenty or more stamens, affixed to the calyx; and the thirteenth class, *Polyándria*, has from twenty to a thousand, affixed to the receptacle.

The eleventh class, *Dodecándria*, has six orders, distinguished, as in the former classes, by the number of pistils: in the first order, *Monogýnia*, we have two British plants, asarabacca, the pulverised leaves of which act as a powerful snuff; and loosestrife, *L*ýthrum (from two Greek words signifying black blood, in reference to the colour of the flowers) Salicària (willow-like; from *salix*, a willow), a very handsome plant, not unfrequently cultivated in gardens. Among the more important exotics is the mangosteen (Garcín*ia Mangostàna*), the fine fruit of which is equally delicious, refreshing, and salutary. In the second order, *Digýnia*, we have but one British plant, agrimony, formerly much used in medicine; and of late years a principal ingredient in most of the compounds called British tea. The sweet mignonette, so general a favourite, is a species of *R*esèda, a genus belonging to the third order, *Trigýnia*. We have a British species, called wild mignonette; but it is deficient in the principal charm of the exotic plant, its fragrance. Another British species is used for dyeing yellow. The common house-leek, frequently seen on the walls and roofs of cottages, is in the sixth order, *Dodecagýnia*.

The twelfth class, *Icosándria*, has three orders: the first, *Monogýnia*, includes the plum, cherry, apricot (*P*rùnus); the peach, nectarine, almond (*A*mýgdalus), the pomegranate, the clove tree, the allspice tree, the myrtle, the syringa, and the extensive and very curious genus *C*áctus; of which many of the species are interesting, and some singularly beautiful. The second order consists of plants furnished with from two to five pistils (the number varying, not only on the same species, but sometimes on the same plant), and is styled *Di-Pentagýnia*. It comprehends the apple and pear in all their varieties (*P*ýrus); the quince, the medlar, the hawthorn, and that large and brilliant genus, Mesembryánthemum, &c. &c. The order *Polygýnia* is possessed of the raspberry, blackberry, &c. (*R*ùbus); the strawberry (Fragària), the beautiful genus *R*òsa, &c.

The class *Polyándria* was formerly divided into seven orders. Sir J. E. Smith recommended that they should be reduced to three; the pistils being so variable in number as to cause much confusion to no purpose. In his *English Flòra*, therefore, he has thrown several orders into one, which, the number five mostly prevailing, he calls Pentagýnia; but observes that the pistils vary from two to six. In the first order of this class, *Monogýnia*, are found many handsome plants, and many of ill repute: but plants, like human beings, however ill a name they bear, are generally found to possess some redeeming qualities. The white poppy (Papàver somníferum), which produces opium, should rather be lauded for its beneficence, than branded as an assassin: its virtues are acknowledged by thousands who have had experience of them, and, while treated with the respect it so well deserves, it exhibits virtues only. Power is a dangerous thing, and all who possess it should be approached with caution; but it is not always employed to destroy. Even hellebore and aconite, great as is their power to destroy life, are sometimes employed to preserve it. The lime tree (Tília) alone might redeem all the sins of the other genera in this order: in this country it is cultivated chiefly for its scent and beauty; but, to say nothing of its reputation for purifying the air around it, the many uses to which it is applied, more particularly by the Russians, show, at least, of what it is capable. Nor should we forget that this tree, which we may proudly claim as a Briton, gave its name to the illustrious Linnæus, whom every naturalist may style his friend. Among the handsomest of our native plants in this order, we may reckon the white and yellow water-lilies: the former nearly related to the sacred lotus flower of the Egyptians; the latter, in Norfolk called brandy-bottles, possessing so strong a scent and flavour of that spirit, that they are not only used to flavour sherbet, but the Greeks make a cordial of them. Some of the more remarkable exotics are, the mammee apple; the anchovy pear; the Sarracènia, with its curious tubular leaves; and the Córchorus, one species of which so generally enlivens our gardens with its profusion of sunny-coloured flowers. In the second order, *Pentagýnia*, the principal genera are the pæony, the larkspur, wolfsbane, and columbine; of all which we have native species. The third order, *Polygýnia*, contains, besides the Anemòne, Ranúnculus, Clématis, and Helléborus, of which we have British species, the beautiful tulip tree, Liriodéndron Tulipífera, and the noble Magnòlia.

The fourteenth class, *Didynàmia*, is distinguished by four stamens, of which two are longer than the rest. The flowers have a tubular calyx, generally five-cleft; an irregular monopetalous corolla, of which the border is mostly divided into two lips, the upper erect, the lower spreading and three-cleft. They have but one pistil, of which the stigma is cleft or notched. This class is divided into two orders; *Gymnospérmia* (from the Greek, a naked seed), the seeds, generally four in number, lying uncovered at the bottom of the calyx; and *Angiospérmia* (from the Greek, seed-vessel), the seeds being enclosed in a capsule. In addition to the characters by which this class is principally distinguished, there are, in the first order, so many points of general resemblance, that a very little experience will enable the young botanist to detect them at sight. One glance at the flowers of the ground-ivy, Glechòma *hede*ràcea (*fig.* 91.), and the white dead-nettle, *L*àmium álbum (Vol. I. p. 429. fig. 186.), will give a better idea of this order than any explanation that I have space to offer. Here are placed many of our aromatic herbs, as mint, thyme, marjoram, balm, lavender, hyssop, &c. The form of the corolla is much more varied in the second order than in the first: in some genera it is elongated into a spur at the base, and the mouth closed; in others, the tube is simply cylindrical, and the mouth open; some have a bell-shaped corolla, as the foxglove; while a few, more regularly formed, are less strikingly characterised by their general air, as the Linnæˋ*a*, an elegant little plant, bearing the name of the illustrious Swede, and, like himself, *sui generis*. As there is one Linnæus, so is there one Linnæˋ*a*, described by himself as "a little northern plant, long overlooked, depressed, abject, flowering early." He might have added, — standing alone in systematic botany, whether *natural* or artificial; and occupying an elevated station, in which nature had placed, and time would preserve, it. Among the more remarkable exotics of this order are the trumpet-flower (Bignòn*ia*); the celebrated *A*cánthus of the architect; and the calabash tree, of the fruit of which, the pulp being scooped out, the rind is used as a basin to contain liquids. This order is also remarkable for the number of its genera, named in honour of botanists, among whom (not to mention their great sovereign Linnæus) we find Gesner, Thunberg, Gmelin, Haller, Gerard, Sibthorp, Celsius, &c.

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The fifteenth class, *Tetradynàmia* *, is distinguished by six stamens, of which four are longer than the other two. It is composed of the cross-shaped, botanically termed cruciform, flowers. They have a calyx of four leaves, a corolla of four petals, and one pistil. Four stamens are placed in pairs on opposite sides of the germen; and between each pair a single stamen, which, bending outwards to include a small gland, serving as a nectary, at the base of the germen, is thereby rendered shorter, or rather lower, than those which have no such interruption. There are two orders, distinguished by the form of the seed-vessel, which, in the first, *Siliculòsa*, is short and broad; in the second order, *Siliquòsa*, long and narrow, formed of two valves, with the seeds fastened along both sutures; in many cases there is a membranous portion between, and parallel with the valves, dividing the interior of the silique into two cells. In the first order, we have the British plants, dyer's-woad, horse-radish, and sea-kale; in the second order, the cabbage, turnip, mustard, water-cress, "the lady's smock, all silver white," and the stock gillyflower; other stocks, wallflowers, rockets, &c., from the south of Europe; and the radish, from China.

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* The words Didynamia and Tetradynamia have been differently, but not satisfactorily, derived.

The sixteenth class, *Monadélphia*, is characterised by the lower part of the filaments being all united, sometimes only at the immediate base, sometimes half their length, or more. This union is expressed in the name of the class, which is formed from two Greek words, signifying one brotherhood. The orders of this class are distinguished by the number of stamens (in the first thirteen classes, a classical character). The first order, *Triándria*, claims the tamarind tree; the tiger flower, as short-lived as it is splendid; and a few other genera of less note. The most important genus in the second order, *Pentándria*, is the passion flower (Passiflòra), of which several species bear edible fruits, juicy, well-flavoured, and extremely refreshing in a hot climate; and all are eminently ornamental. Here stands the heron's bill (Eròdium), which formerly made a part of the genus Gerànium, now divided into three genera, all named in reference to the beaked fruit. The stork's bill (Pelargònium), comprising most of the African geraniums, constitutes the third order, *Heptagýnia*. The crane's bill (Gerànium), from which the two last-mentioned have been separated, retains its old name, and its station in the fifth order, *Decándria*. Many of the species are British plants, some very common, but all more or less pretty and interesting. *G.* lùcidum, of which the flowers are small and comparatively inconspicuous, discovers considerable beauty when narrowly observed; more particularly the calyx. It is an elegant little plant, with a tendency to redden; the leaves, as though emulating the petals, growing redder and redder every day, until the latter become pale in the comparison. The same change may be observed in some other species, more especially in *G.* Robert*iànum*, which may often be seen in the autumn, of one deep and vivid crimson. In this order is placed the splendid genus Brównea, named, not from the celebrated botanist now living, but from a physician of the last century, who published a natural history of Jamaica. The principal genera in the sixth order, *Dodecándria*, are Monsòn*ia*, and Astrapæ̀a; the latter named from a Greek word signifying lightning, in reference to the splendour of its flowers. The seventh order, *Polyándria*, contains several extensive and important genera, as the mallow (*M*álva); *H*ibíscus; cotton plant (Gossýpium); the silk-cotton tree (Bómbax); the sour gourd (Adansòn*ia*), said to have a thicker trunk than any other known tree; the Caméll*ia*, in which genus some botanists include the tea tree, and other trees and shrubs of surpassing beauty.

The character of the seventeenth class, *Diadélphia* (two brotherhoods), is the combination of the filaments in two sets, equal or unequal. These are sometimes observed slightly to cohere at the immediate base. The orders are four, distinguished, as in the last and the next class, by the number of stamens. *Pentándria* contains only a few genera of inferior note; *Hexándria* consists chiefly of the beautiful genus *F*umària; the milkwort (*P*olýgala) is the principal genus in the third order, *Octándria;* the great wealth of the class is in the fourth order, *Decándria*, which holds a high rank both for the utility and beauty of its productions. The genera have papilionaceous flowers (butterfly-like; from *papilio*, a butterfly); and, in consideration of their family likeness, many have been admitted which more properly belong to *Monadélphia.* The license is perhaps to be regretted, as there are still some papilionaceous plants excluded; if, in a flower of this form, there be ten stamens perfectly distinct, it has its place in the tenth class: if the stamens be in any way combined, it will be found in *Diadélphia.* The young botanist will mostly find nine of the stamens combined, and one simple, in the flowers of this order; the calyx of one leaf, five-cleft at the margin, the lower segment longer, the two upper rather shorter, than the lateral segments, and the corolla of five petals, all affixed to the receptacle. Two of the petals cohering at the lower side, form a boat-shaped cavity, termed the keel, in which the pistil and stamens are lodged, taking the same curved direction; two other petals, called the wings, are placed at the sides of the keel; while the fifth, termed the standard, longer and broader than the rest, crosses and rests upon the upper side of the keel, closing in the stamens and pistil. The combination of the filaments usually corresponds with the length of the germ; beyond the germ they are all distinct. Where there is one simple stamen, it serves as a door by which the germ can escape from confinement as it increases in size, and it fits in so exactly between the sides of the broader filament, as sometimes to appear as if a part of it. When all the filaments are combined, they either form a tube enclosing the germ, which, in its increase, forces itself a way out, by rending it in two; or the combined part folds round the germ, the sides closely meeting, but not uniting. The seed-veſsel is either a pod of two valves, both of which have seeds affixed to a receptacle running along their upper edge, as in the pea; or a succession of closed one-seeded joints, as in *H*edýsarum, &c.

Linnæus said of this order, that it did not contain one noxious plant. This, as Sir J. E. Smith observes, is saying rather too much; but it has very few deserving of that epithet (none of British growth), while it produces much wholesome herbage for cattle, and a great variety of seeds eaten by man. We may instance clover, lucerne, saintfoin, tare, peas, beans, lentils, &c. The tonquin bean, so much admired for its fragrance, is the seed of a plant of this order: another produces the red saunders wood, others yield indigo, liquorice, &c. Of the more ornamental plants, we are well acquainted with the laburnum, the acacia (Robín*ia* Pseudacàcia) so valuable for its hard durable wood, the sweet pea, everlasting pea, broom, the golden furze of our heaths, &c., to say nothing of the Glýcine, Erythrìna, and other exotics less generally known. But the most remarkable plant in this order is the *H*edýsarum gýrans, familiarly called the moving plant, which has an irregular and apparently voluntary motion, for which no external cause has yet been ascertained. Sometimes many leaves are moving in various directions, sometimes one leaf, or one leaflet only; it is quiescent in a strong wind, or sun, and in general on very hot days,—shall we say, because too languid for exertion, or because it does not then require exercise to keep it warm? This appearance of voluntary power is calculated to excite doubts whether plants may not be more capable of sensation than has been supposed: and whether they may quite approve of the manner in which we lord it over them.

The eighteenth class, *Polyadélphia*, has the filaments so combined at the base as to form more than two sets. This is a small but important class. In the order *Decándria* stands the chocolate nut tree, Theobròma (from two Greek words signifying God and food). *Polyándria*, with many genera eminently ornamental, has one invaluable genus, of which the extraordinary beauty is its least merit; the *C*ìtrus, to which we are indebted for the lime, the lemon, the citron, and the orange. The orange tree may be considered as one of the graces of the vegetable world, uniting in itself a multiplicity of charms. It is a tree of handsome growth, with polished evergreen leaves of the most elegant form, a profusion of beautiful and fragrant flowers, and a wholesome and delicious fruit, cased in gold, which has inspired the poets with a thousand exquisite images; yet, not satisfied with all these perfections, it insists upon yet further provoking the *genus irritabile*, by possessing them all at once; the delicate white blossoms breathing out their sweetness upon the very cheeks of the glowing fruit. Such is the *beauty* of the tree; ask the feverish invalid if its *benevolence* be not yet greater.

We have one British genus of this order, St. John's wort (*Hypéricum*), one species of which the peasants of France and Germany gather on St. John's day, and hang in their windows, as a charm against evil spirits.

The nineteenth class, *Syngenèsia*, has compound flowers, with the anthers united into a tube. The name of the class (from the Greek, growing together) tells in two ways; applying both to the union of the anthers and to the number of florets forming the compound flower. The florets are of two kinds; either tubular, with a spreading five-cleft margin, or *ligulate*, long, flat, and narrow, with a very minute tube at the base. They have five stamens and one pistil, and are crowded many together on one common receptacle, seated in a common calyx. In the first order, *Polygàmia Æquàlis*, the florets are all ligulate, as the common dandelion. In the second order, *Polygàmia Supérflua*, a number of ligulate florets wanting stamens are ranged round the circumference of the receptacle, and called the rays; while the centre is crowded with tubular florets, having both stamens and pistil, and is termed the disk, as in the daisy, in which the disk is yellow, and the rays white. In the third order, *Polygàmia Frustrànea*, the florets of the circumference have neither stamens nor pistil, as may be seen in the common blue corn-flower. In the fourth order, *Polygàmia Necessària*, the florets of the disk have no pistil, the marginal florets no stamens, as may be observed in the common garden marigold (Caléndula). In the last order, *Polygàmia Segregàta*, the florets have, in addition to the common calyx which protects them all, a partial calyx, sometimes to each separate floret, sometimes containing two or more. Of this order we can give no familiar example. From this class we derive several esculent plants and bitter herbs, as the lettuce, endive, cardoon, artichoke, tansy, wormwood, chamomile, &c.; and some ornamental flowers, as the chrysanthemum, xeranthemum, sunflower, dahlia, asters, French marigold, &c.

The twentieth class, *Gynándria*, has the stamens proceeding from the germen or the style. The flowers of this class have a peculiar construction, not to be hastily explained; and the young botanist will do well to make himself practically acquainted with the less difficult classes, before he attempts the study of this, or the twenty-fourth class, *Cryptogàmia.* It contains many beautiful genera, among which the *O*′rchis tribe are conspicuous. The roots of several species of *O*′rchis, dried and ground, form the powder called salep (as it is supposed, from the original Arabic, *sahhleb*).

The twenty-first class, *Monœ̀cia*, comprehends such plants as have their stamens and pistils in different flowers on the same plant. The name signifies one house; the plant being so considered, we may suppose the flowers to be the rooms in which its unsocial inhabitants lodge. In the first order, *Monandria*, we find the bread-fruit tree, Artocárpus (of which word the English name is a translation), so well known for its large bread-like fruit, forming the chief sustenance of thousands of human beings in the Indies and South Sea islands; and the curious genus *E*uphórb*ia*, of which many of the species grow in the most grotesque and fantastic forms. They abound in an acrid, milky juice, which is applied to various purposes; that of *E.* helioscòpia, a British species, is used for the cure of warts; whence the plant is familiarly termed wartwort. In the third order, *Triándria*, stands the Indian corn, of which Mr. Cobbett has latterly been so zealous to promote the cultivation in this country; and the sedge, many species of which are employed for tying up vines, making chair bottoms, weaving over Florence flasks to protect the glass, &c. The fourth order contains some valuable trees and evergreen shrubs, as the alder, mulberry, box, aucuba, &c. In this good company we find the nettle, which has its leaves covered with tubular bristles, each furnished with a bag of poison at its base, of which most of us have experienced the powers. Yet the plant has its uses: cloth, ropes, and paper may be made from the stalks, and the young shoots are frequently eaten as greens. Some insects, as mischievous as themselves, may sometimes feed upon the fresh leaves; but they also afford food to some of our loveliest butterflies. The genus *A*márantus is in the order *Pentándria.* In the sixth order, *Hexándria*, is the cocoa-nut tree, one of many fine palms distributed in this and the two following classes. It furnishes to the Indians almost every necessary of life: every part of it has its uses. A house to live in, furniture, clothing, and food, are all obtained from this tree, which demands a volume to do it justice. Some of the most important genera of the seventh order, *Polyándria*, are the beech, birch, nut, chestnut, walnut, plane, hornbeam, and oak, an extensive genus, of which the cork tree is a species. The sweet-gum tree (Liquidámbar) is valuable both for the fragrant gum from which it is named, and for its hard and compact wood. Lords and ladies are of this order. The last order, *Monadélphia*, also, is a very important one, comprising the areca-nut tree, the pine, fir, larch, cypress, cedar, arbor vitæ, &c. Gourds, cucumbers, melons, tapioca, castor oil, and various medicinal drugs, are obtained from plants of this order. Here, too, are placed the tallow tree, and the poisonous manchineel of the West Indies.

The twenty-second class, *Diœ̀cia* (two houses), has the stamens and pistils not only in separate flowers, but on separate plants. The principal genus in the order *Diándria* is the willow, of which Sir J. E. Smith has enumerated sixty-four native species. In *Triándria* we find the date palm, and the rope-grass, generally used at the Cape of Good Hope for thatching houses, and found to be remarkably durable. In *Tetrándria* are placed mistletoe, and the candleberry myrtle. *Pentándria*, though a small order, is a wealthy one, being possessed of the pistacia, the hop, hemp, &c. In *Hexándria* is the yam, and the poplar occupies the order *Octándria*. In *Polyándria*, besides the butcher's broom, which has its flower-stalk concealed under the upper surface of the leaf, are the juniper, the yew, the nutmeg tree, and the pitcher plant, so named from a tubular pitcher-shaped appendage at the extremity of the leaf.

In the class *Polygàmia* there are perfect flowers, flowers with stamens, and flowers with pistils only, either on the same or on distinct plants. Those which bear them on the same plant are included in the order *Monœ̀cia;* those which bear them on separate plants form the order *Diœ̀cia*. In the first we find the genus Mimòsa, of which two remarkable species are the sensitive and the humble plants; the interesting genus *Acàcia*, &c. In the second order are the carob tree, the fruit of which was supposed to have been eaten by St. John in the wilderness, whence it was named St. John's bread; the bread-nut tree of Jamaica, of which the fruit is boiled and eaten with their meat by the negroes; the date plum; ginseng, the root of which is considered, in more countries than its own, as a remedy for every ill, whether of mind or body; and that peculiarly interesting genus, the fig tree.

As these letters were intended for the use of persons commencing the study of botany, I have mentioned chiefly such genera as are more or less known in this country: by far the greater number, even of these, I have necessarily passed unnoticed; and many, but cursorily mentioned, might occupy volumes. The two last-mentioned classes, in particular, contain many genera of extraordinary interest, as the oak, fir, willow, Mimòsa, *A*càcia, *F*icus, &c.

It will not be necessary at present to touch upon the twenty-fourth class, *Cryptogàmia.* The young student should be well familiarised with the less difficult classes before he attempts to study plants so imperfectly understood even by the best botanists. At some future period I purpose to speak of this class more at length than circumstances will admit of my doing at this moment. Till then, reader, farewell.

ART. XI. *Illustrations of Antediluvian Zoology.*

By R. C. TAYLOR, Esq., F.G.S.

(*Concluded from* p. 287.)

WE resume our notices of Antediluvian Zoology, continuing the division of

ARTICULATED ANIMALS.

Insects. — When we consider the enormous proportion of insects to the rest of the animated beings in the present world, — being, according to Baron Humboldt, no less than 44,000 out of 51,700, — we might expect to discover more frequent traces of these tribes in the fossil world. Whether they did not prevail in such numbers during the former period of the globe, or whether, as is most probable, the extreme delicacy of their structure was unfavourable to their preservation, we have only the fact, that but scanty traces of their former existence, particularly in the elder beds, do now appear.

The elytra of two or three species of Coleopterous Insects are found in the Stonesfield calcareous slate. They are also traced in the coal shale of the oolite series in Yorkshire, and occasionally in older coal slates, and accompanying some other vegetable deposits. They have been observed in the peaty beds below the diluvium of the Norfolk coasts, and in a similar bed on the Yorkshire and Lincolnshire coasts. In the submarine forest of Mount's Bay, Dr. Boase recognised fragments of insects, particularly the elytra and mandibles of the beetle tribe, which still display the most beautiful shining colours when first dug up. The wings of beetles were found in splitting the shale at Danby coal-pits in Yorkshire.

We proceed to a more important division, that of the

VERTEBRATED ANIMALS.

Birds. — These remains also are of rare occurrence; and the same remark might be applied to them, with respect to proportion, as to the preceding order. It does seem a singular circumstance, that more birds have not been found fossil, when we consider that they now are, as regards species, five times as numerous as the Mammàlia. The known proportions are estimated by Baron Humboldt as follows: —

In the world.		In Europe only.	
Birds	4000 species.	Birds	400 species.
Reptiles	700	Reptiles	30
Mammàlia	500	Mammàlia	80

In the opposite or southern zone we find likewise nearly five times more birds than Mammàlia, and towards the equator the proportion of birds increases considerably.

These facts are remarkably opposed to those furnished by the antediluvian zoology, where, according to Cuvier's enumeration of fossil animals, it appears that in those ancient periods the globe was inhabited much more by Mammàlia than by birds.

Bones of birds have been detected in the oolite limestone of Stonesfield by Dr. Buckland, and two species in the ferruginous sandstones of Hastings and of Tilgate Forest by Mr. Mantell. Since the discovery of a perfect skeleton of the flying reptile to which has been affixed the name of Pterodáctylus, which appears both in the lias of Dorsetshire and in the tertiary beds of Paris, it has been suggested by Dr. Buckland that some of the bones at Stonesfield, which have been hitherto assigned to birds, may possibly belong to this singular animal. Should this supposition prove to be well founded, our proofs of the ancient existence of birds will be much circumscribed.

Ten species of birds have been furnished by the gypsum quarries near Paris. *

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* The editors of the English edition of the *Animal Kingdom* have pointed out the errors of compilers relative to fossil birds, particularly as to the *petrified cuckoos*, arising from a mistaken quotation from Zannichelli, who speaks of a fish bearing that name, and not of a bird. A mistake, equally ludicrous, has been repeated in this country. Martin, fifty years ago, described the bird called the *stone* curlew as existing in the neighbourhood of Thetford. A work of very extensive circulation and popularity has subsequently assured its readers that *petrified* curlews have been discovered at Thetford, and the error seems likely to be perpetuated by other equally accurate topographers!

Fishes. — The most common form in which they are found is compressed between the laminæ of sandstones, schists, calcareous slates, and Purbeck marble. Their teeth, scales, and vertebræ are abundant in many formations between the lias and London clay, particularly in the latter, and are even yet more plentiful in the Suffolk crag beds. These teeth are commonly ascribed to varieties of sharks. Palates, or "déntes molàres," are found in the oolites, and are beautifully preserved in chalk. No animal remains are common to so many formations, from the transition limestone to the crag, as the spinous radii of some species of Balístes.

Mr. Mantell has observed eighteen or more kinds of fishes in the Sussex chalk, and several genera and species in the Tilgate stone. The mineralised remains of fishes, particularly towards the upper portion of our strata, are found to accord with existing genera, and even with some species, more than most fossils. Much remains to be done in this department of natural history.

One fact like that observed in the Testàcea, mentioned by several writers, is too interesting to be passed over, the concentration of many genera of fossil fishes which are now dispersed in various seas. A vast collection of impressions of fish have long been known to exist in the calcareous schist of Monte Bolca, many of which have been identified with living species. In M. Bozza's collection, out of 100 known fishes, 4 were ascertained to be similar to those living in the seas of Otaheite.

In the Paris museum, containing 62 species, 28 are said to be common to European seas; 14 to Indian seas; 2 to African; 13 to South American; and 5 to North American.

In another collection, of 105 species, from the same place, M. Saussure decided that 34 resemble those of European seas; 39 Asiatic; 3 African; 18 South American; 11 North American.

Recent observation and more critical examination have determined that a larger proportion than is here assigned may be classed with the inhabitants of our seas.

Professor Sedgewick and Mr. Murchison discovered numerous fossil fish in the calcareo-bituminous schist of Caithness and the Orkneys. Some of these, on being submitted to the inspection of Baron Cuvier, were considered by him to be analogous to the bony pike. On examination of more perfect specimens, Mr. Pentland confirmed the conjecture of Baron Cuvier, and ascertained two new genera, one of which contains four, the other two, species of Ichthyólites. They are probably all of fresh-water origin, and are accompanied by remains of Trìonyx (?), but no marine exuviæ have been observed. Professor Sedgewick conceives this bituminous schist to be a perfectly distinct fresh-water formation, situate between the new and the old red sandstones, and not at present identified with any part of the English series.

Mr. J. Phillips has figured teeth, vertebræ, and other bones of fishes from the gault, coral rag, Oxford clay, and lias beds, of Yorkshire. The marl slate of the magnesian limestone of Durham has produced seven or eight species of Ichthyólites, belonging to the order Malacopterýgii abdominàles and the genus Palæothríssum. To the Reverend A. Sedgewick we are indebted for a fine series of illustrative drawings of these fish. *Geol. Trans.*, vol. iii. pl. 8. to 12.

OVIPAROUS QUADRUPEDS (AMPHI'BIA).

Saúria. — An improved acquaintance with comparative anatomy has led to the classification of numerous animals of this order. Several genera are now known in different formations. Mr. Coneybeare is of opinion that eleven or twelve distinct species of gavials and crocodiles occur in the secondary strata, and in as many different geological sites. They commence in the new red sandstone, and occur in the lias, and thence upwards to the London clay. As the recent species of crocodiles and gavials are natives of hot climates, an important inference has hence been drawn, that these fossil species were also inhabitants of hot climates; and it is confirmatory of other circumstances which seem to show that all fossils originally existed in a higher temperature than prevails at present in the latitudes where we discover them. These opinions have given rise to an animated controversy, conducted by Dr. Fleming, Mr. Coneybeare, and Dr. Buckland, in the *Edinburgh Philosophical Journal.*

The lias beds are rich in saurian remains, and the fragments that are found in the Stonesfield slate, the ferruginous sandstone of Tilgate Forest, of Hastings, and the Isle of Wight, indicate the prodigious magnitude of the reptiles to which they belonged.

It does not appear that the fossil skeletons of any saurian animals assimilate precisely to living species. By far the greater number are of extraordinary conformation.

Thus, the Plesiosaúrus (*fig.* 92.) approaches to the genus Crocodile, but possesses double the number of vertebræ; a neck resembling the body of a serpent; the head of a lizard; nstead of feet, it has swimmers like a whale, or paddles like

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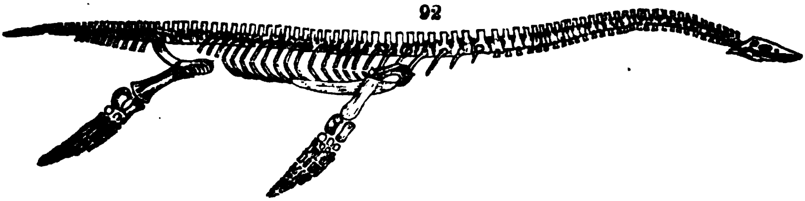

Restoration of the Plesiosaúrus dolichodeirus. *Geol. Trans.*, vol. i. pl. xlix. 2d series, fig. 6.

those of turtles, and in other respects its proportions present some approach to those animals. *

The Ichthyosaúrus (*figs.* 93. and 94.) recedes from the form of the lizard family, and in the structure of its vertebræ it approaches that of fishes. It has forty-one cervical and dorsal

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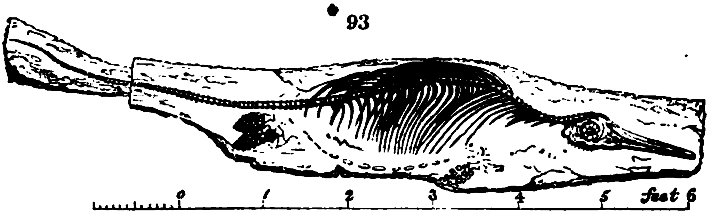

Sketch of Ichthyosaúrus, discovered in the Whitby alum shale, and figured by Messrs. Young and Bird, *Geol. of Yorkshire.*

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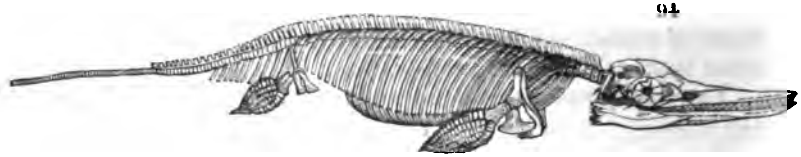
* From Mr. Coneybeare's interesting anatomical description of the Plesiosaúrus we learn that this animal had from thirty-five to forty-one joints in the neck, which is about seven times the number possessed by quadrupeds and Mammàlia; five times that by reptiles; three times that by birds; and twice, at least, that by the Ichthyosaúrus.

With reference to the supposed habits of this animal, we cannot forbear quoting this accomplished naturalist:—"That it was aquatic, is evident from the form of its paddles; that it was marine, is almost equally so, from the remains with which it is universally associated; that it may have occasionally visited the shore, the resemblance of its extremities to those of the turtle may lead us to conjecture. Its motion, however, must have been very awkward on land; its long neck must have impeded its progress through the water; presenting a striking contrast to the organisation which so admirably fits the Ichthyosaúrus to cut through the waves. May it not therefore be concluded (since, in addition to these circumstances, its respiration must have required frequent access of air), that it swam upon or near the surface, arching back its long neck like the swan, and occasionally darting it down at the fish which happened to float within reach? It may, perhaps, have lurked in shoal water along the coast, concealed among the sea-weed, and, raising its nostrils to a level with the surface from a considerable depth, may have found a secure retreat from the assaults of dangerous enemies; while the length and flexibility of its neck may have compensated for the want of strength in its jaws, and its incapacity for swift motion through the water, by the suddenness and agility of the attack which they enabled it to make on every animal fitted for its prey, which came within its extensive sweep."

vertebræ, and is also furnished with paddles, intermediate between feet and fins. " This genus exhibits the snout of a dolphin, the teeth of a crocodile, the head and sternum of a lizard, the swimmers of a whale, and the vertebræ of a fish." Found in the lias, Stonesfield slate, Oxford clay, Kimmeridge clay, coral rag or Malton oolite, and probably in other formations.



Restoration of Ichthyosaúrus commùnis, by the Rev. W. D. Coneybeare, *Geol. Trans.*, vol. i.

The Megalosaúrus, or gigantic lizard of Stonesfield and Tilgate Forest, is computed by Dr. Buckland to be 40 ft. long. It possesses resemblances both to the monitors and the crocodiles.

Mr. Mantell estimates the Iguánodon, the great herbivorous reptile of the Tilgate stone, to have far exceeded the last in magnitude, and to have attained the extraordinary length of 60 ft. This appears to have been an inhabitant of fresh-water lakes, and rivers.

Vertebræ of another saurian animal have lately been discovered in the Portland series at Thame, near Oxford, of still more extraordinary dimensions. They are twice as large as those of the Iguánodon, and four times the size of the vertebræ of the Mástodon.

The Stonesfield slate contains perhaps one of the most remarkable assemblages of organic remains that are known to geologists. Here are marine, amphibious, and terrestrial animals, associated with terrestrial, fluviatile or lacustrine, and marine plants, and with birds and insects; *all collected in a bed whose greatest thickness does not exceed 6 ft.*

This deposit has a singular parallel in the ferruginous sandstone of Tilgate Forest, where a similar series occurs, notwithstanding the formations are of different periods. Here occurs, blended with the bones of a gigantic species of crocodile, of the Megalosaúrus and the Plesiosaúrus, the Leptorýnchus, the Pterodáctylus, and the remains of turtles, birds, shells, and tropical vegetation, that extinct herbivorous reptile to which Mr. Mantell, at the suggestion of Mr. Coneybeare, has given the name of Iguánodon, from its close affinity to the recent *Iguàna* of the West Indies. The great difference appears to be in the size of the fossil animal, which is of gigantic proportions. It is concluded that, if an amphibious, it was not a marine reptile, but the inhabitant of rivers and fresh-water lakes. The same animal may be traced, in its enormous fragments, on the eastern and western sides of the Isle of Wight, and in the Isle of Purbeck, mingled with the remains of two species of crocodile and the Megalosaúrus. We have figured several illustrations of the teeth of Iguánodon in p. 14. fig. 14.

In Yorkshire, the teeth and vertebræ of saurian animals were noticed by Mr. J. Phillips in the gault or Speeton clay, Oxford clay, Bath oolite, and abundantly in the lias shale.

Vertebræ and teeth of Ichthyosaúrus, Plesiosaúrus, and Crocodile, occur in the old diluvium of Norfolk.

Pterodáctylus, or winged lizard, one of the most extraordinary productions of the fossil world, is an animal which forms the intermediate link, hitherto deemed to exist only in fable, between birds and reptiles.

This creature, previously known in two formations upon the Continent, has been recently recognised in the lias of Dorsetshire.

We cannot resist the temptation to introduce this remarkable animal in the language of Professor Buckland: —

"In size and general form, and in the disposition and character of its wings, this fossil genus, according to Cuvier, somewhat resembled our modern bats and vampyres, but had its beak elongated, like the bill of a woodcock, and armed with teeth, like the snout of a crocodile; its vertebræ, ribs, pelvis, legs, and feet, resembled those of a lizard; its three anterior fingers terminated in long hooked claws, like that on the forefinger of the bat; and over its body was a covering, neither composed of feathers, as in the bird, nor of hair, as in the bat, but of scaly armour, like that of an iguana: in short, a monster, resembling nothing that has ever been seen or heard of upon earth, excepting the dragons of romance and heraldry. Moreover, it was probably noctivagous and insectivorous, and in both these points resembled the bat; but differed from it, in having the most important bones in its body constructed after the manner of those of reptiles. With flocks of such like creatures flying in the air, and shoals of no less monstrous Ichthyosaúri and Plesiosaúri swarming in the ocean, and gigantic crocodiles and tortoises crawling on the shores of the primeval lakes and rivers, — air, sea, and land must have been strangely tenanted in those early periods of our infant world."

Testùdines. — Traces of tortoises (Trìonyx) are first observed in the bituminous schist of the north of Scotland, the geological situation of which is probably similar to that of the coal-measures of England.

Impressions, resembling the footsteps made by tortoises, were not long since noticed on the surface of beds of new red sandstone in Dumfriesshire.

Turtle and tortoises occur in the lias, and occasionally in some intermediate formations, particularly the Purbeck stone, up to the London clay.

There are evidently many of these animals occurring in a fossil state; but much difficulty exists in determining the species. Some of them are marine, and others belong to freshwater deposits. The strata of Tilgate Forest contain some of this class, which Mr. Mantell has determined to belong to the genera Trìonyx, E`mys, and Chelònia. E`mys has also been found at Sheppey.

MAMMIFEROUS ANIMALS.

Marine Mammàlia. Viviparous, producing their young alive.

Cèti. —*Balæ`na*, or Whale, &c. Bones of several cetaceous animals occur in marine diluvium, particularly in Norfolk. They have been traced much earlier in the Stonesfield slate, in the Tilgate stone, the Kimmeridge clay, and in limestone near Bath. Their occurrence is somewhat rare with us, but less so on some parts of the Continent. In Italy, entire skeletons, at 1200 ft. elevation. Baron Cuvier enumerates 10 fossil species. "One is like a species native of the Ganges; a second has no close affinity with any known species; while the remaining eight bear a resemblance to the species at present natives of the British seas." — *Dr. Fleming.*

Lamantines and Dolphins have not yet been observed in England. They have come under the observation of Continental geologists, in beds allied to our highest marine formations.

P*hòcæ, or Seals.*—In marine diluvium on the banks of the Forth.

QUADRUPEDS.

The animals of this class whose skeletons abound amidst the débris of the ancient world, are conceived to have been in existence at that epoch which immediately preceded the deluge. Accumulations of similar débris, containing precisely similar animal remains, have, from time to time, been discovered in every explored part of our globe. Hence an argument has been employed, that the climate of that ancient world was universal, at least that the temperature was more equal at that period than now.

With regard to the geological distribution of fossil quadrupeds, Baron Cuvier observed that mammiferous sea animals are in more ancient strata than mammiferous land animals; oviparous quadrupeds than viviparous quadrupeds. The oviparous quadrupeds apparently began to exist at the same time with the fishes; the land quadrupeds not until long after, and after the period when most of the shells were deposited.

On comparing the antediluvian animals with those existing, it is seen that the principal loss has fallen upon the Carnívora, while the ruminants are preserved. Another singular fact has been elicited through the labours of the baron. "The fossil ruminants appertain precisely to the genera and subgenera at present most common in the northern climates: to the aurochs, the musk-ox, the elk, and the rein-deer; while the fossil Pachydérmata, the elephant, the rhinoceros, the hippopotamus, and the tapir, are limited at present to the torrid zone."

Carnívora. — Remains of carnivorous animals are frequently found in our island. The supposed antediluvian fissures of rocks, chiefly in the mountain limestone, red sandstone, and oolite, are their principal receptacles. They are derived from several extinct species of hyænas, wolf, tiger, bear, and weasel. (*fig.* 95.)

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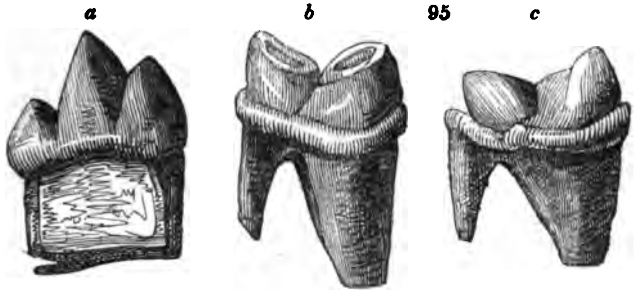

a, Molar tooth of wolf; b, molar tooth of tiger; c, molar tooth of hyæna. From Kirkdale cave.

Science is indebted to the zealous researches of Dr. Buckland for investigating the circumstances connected with the caverns where these animals have been discovered. Similar bones have been found, mixed with brick earth and lacustrine exuviæ, at Brentford, in gravel at Rugby, and in diluvium near Maidstone. It is probable that all the animals whose remains have been seen in caves will be traced in the diluvial or transported gravel, an opinion which is derived from high geological authority. In Yorkshire, an interesting discovery has more recently been communicated by Mr. Vernon, of the bones of the lion and wolf mixed with those of large herbivorous animals, in lacustrine marl, beneath diluvial gravel. Baron Cuvier describes 20 or more species of fossil Carnívora, including several small species from the quarries of Montmartre. (*fig.* 96.)

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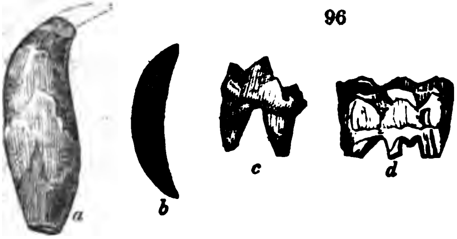

a, Canine tooth or tusk of bear; reduced scale.
b, Tusk of fox; full size.
c, Great molar tooth of fox.
d, Molar tooth of hog.
All from Kirkdale cave, and figured from Dr. Buckland's *Reliquiæ Diluvianæ.*

The slate of Stonesfield, near Oxford, has furnished three or four specimens which were derived from carnivorous Mammàlia of more than one extinct genus. Mr. Broderip has described and illustrated one of these in the *Zoölogical Journal.* It represents the lower jaw of a didelphis or opossum, of the size of a small kangaroo rat; and, as Professor Buckland observes, "forms a case hitherto unique in the discoveries of geology, viz. that of the remains of a land quadruped being found in a formation subjacent to chalk."

Herbivorous Quadrupeds occupy the same geological position with the foregoing fossil Mammàlia. The larger animals of this class are found to possess anatomical differences from those now existing. They are subdivided into the following orders: —

Pachydérmata, thick-skinned herbivorous quadrupeds, having more than two toes to the foot, and incisive teeth in both jaws.

The Kirkdale cave has furnished bones of the elephant, rhinoceros, hippopotamus, and horse.

Bones of the elephant or mammoth are among the most abundant in every part of the globe. We have derived numerous specimens from Suffolk and Norfolk.

The Mástodon, although figured in some works on English geology, does not appear to have been authenticated as a British fossil animal. The peculiar structure of the teeth and bones of these animals has been fully illustrated in various scientific publications.

An extinct quadruped of this order, named by Cuvier Anoplothèrium, found in the plaster quarries of Paris, appears in a single instance to have been traced in the lower freshwater beds of the Isle of Wight.

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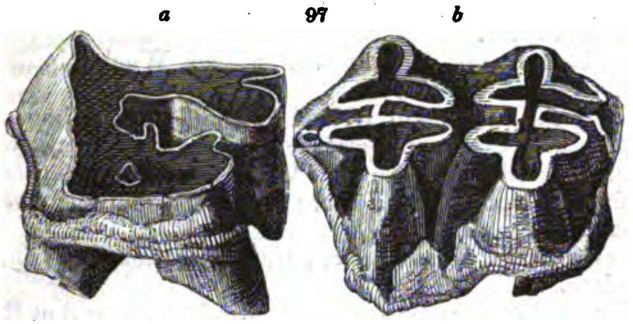

a, Rhinoceros; molar tooth, one third size. *b*, Hippopotamus; worn molar tooth. Also from Kirkdale.

Nearly forty species of extinct Pachydérmata are found in the upper deposits of the Paris environs. Among them are numerous skeletons resembling tapirs and camels, some other species of rhinoceroses and the new genus Palæothèria, and three or four others.

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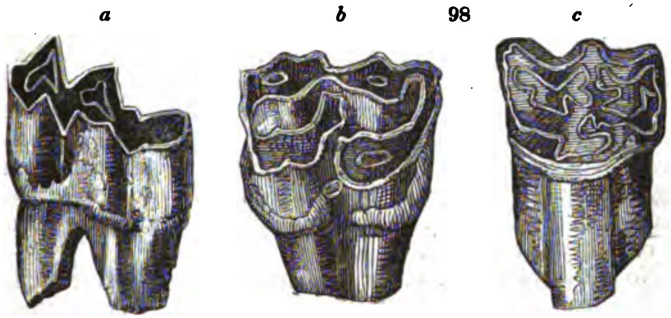


a, Molar tooth of ox, on a reduced scale; *b*, molar tooth of large species of deer, upper jaw, full size; *c*, molar tooth of horse, full size. Kirkdale.

Solípedes. — Bones of the horse (*È*quus) are found in similar situations to the foregoing, and were therefore contemporaneous with those extinct Pachydérmata.

Rumínántia, or *Bisúlca*, are commonly associated with the preceding.

Remains of the ox, the aurochs or bison, and several species of deer, were observed in the cave of Kirkdale. They have been found in the marl of Northcliff in the same county; also above the crag beds of Suffolk, and in the peaty valleys of Norfolk. They are often taken up by the oyster-dredgers on the same coast. At Brentford, Ilford, Gravesend, and numerous parts of the vale of Thames, they are abundant; in fact, they occur, more or less, in all the great diluvial deposits of this country, and in the valleys through which our great rivers pass.

Skulls of the *Bós Úrus* at Walton Naze, Woolwich, Ilford, &c.

The great fossil elk of Ireland is found in peat bogs and gravel beds. Some of these skeletons have been met with, although rarely, in England, at Walton and in Holderness.

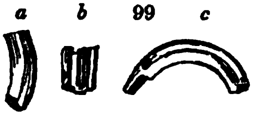
Cérvus Élaphus, or red deer; common in diluvial gravel of the eastern counties.

Cèrvus Dáma, or fallow deer; traced occasionally in similar situations.

Cérvus Caprèolus, or antelope; near Ipswich, and at Roydon, Norfolk.

Rodéntia, or *Gnawers.* — Of this order the Kirkdale cave alone yielded to the researches of Dr. Buckland the genera hare, rabbit, rat, water-rat, and mouse. (*fig.* 99.)

99



a, molar tooth of rabbit; *b*, molar tooth of water-rat; *c*, Incisor of water-rat. From Kirkdale.

Incisors, ascribed to the beaver, have been noticed in the crag.

Of *Quadrumanous* animals there exist no known traces in this or any other part of the globe, either of the ape, monkey, or the *human species.*

In alluvial deposits, calcareous incrustations, peat formations, mines, and volcanic débris, human bones and their accompaniments have frequently been discovered, bearing evidence of very high antiquity; but they are all referable to more recent times than the deluge, and may be explained by similar events of ordinary occurrence.

No works of art, or other indications of the former existence of man, occur in diluvial or tertiary beds. We are therefore led to unite in the opinion that he is among "the most recent tenants of the globe," coincident with the oldest records and traditions of his race; and that the time in which he has inhabited the earth forms but a trifling portion of its absolute duration.

Whether man was coeval with the mastodons, the mammoths, and other mighty animals that once ranged the earth, and left their traces on so large a part of its surface, is an enquiry which there seems little probability will ever be solved. At present we have only the negative fact, that no human remains have been discovered of equal antiquity with those extinct races of animals of which we have made brief mention in this imperfect sketch.

R. C. T.

ART. XII. *Remarks on M. Adolphe Brongniart's Opinion as to the Vegetation which covered the Surface of the Earth at the different Epochs of the Formation of its Crust.* By NAT. JOHN WINCH, Esq. A.L.S. &c.

Sir,

IN the sixth volume of the *Edinburgh Philosophical Journal*, p. 349. &c. &c., is a translation of M. Adolphe Brongniart's essay on the nature of the vegetation which covered the surface of the earth at the different epochs of the formation of its crust. This paper is well worthy the attention of the botanist and geologist; and sorry should I be if the following remark (for it amounts to no more), which in some measure differs from the preconceived opinion of a valued acquaintance, should be thought hostile to his general theory of the ancient state of the globe. But, under the sanction of his name, it is now laid down as a law of nature, not to be disputed, that no phænogamous vegetable existed during the period of the oldest of his epochs, no remains of such plant having been discovered in the first of his four formations, comprising the numerous strata of grauwacke, encrinal limestone, and carboniferous rocks, magnesian limestone, and red sandstone. His systematic division of the vegetable kingdoms which at remote periods have from time to time covered the surface of the earth appears to me excellent; but I can by no means agree with him in the belief, that, in the first of his periods just mentioned, no phænogamous vegetables were in existence; for it is a fact well known in this neighbourhood, and at least thirty years have elapsed since the remark was first made, that the large trunks of trees found mineralised in our sandstone strata were branched in the same way as our forest timber, and must of course belong to the dicotyledonous subdivision of plants. As a proof of this, it is only necessary to remark that their branches have been thrown out from knots which enter the heart of the tree, as is the case with trees of a similar description at the present day. This mode of growth, if I mistake not, never occurs in vascular cryptogamic vegetables, however gigantic may be their size, though it obtains in the tribe *Pinus*, among which the cotyledons are variously formed. On a future occasion I may trouble you with a few memoranda respecting the vegetable fossils embedded in the lias shale of Yorkshire.

I am, Sir, &c.

NAT. JNO. WINCH.

Newcastle upon Tyne, Dec. 10. 1829.

Art. XIII. *Notes on the Weather at Florence during the past Winter.* By W. Spence, Esq.

An account of the weather at any place for a single season can seldom be of much value; but as some of your readers who attend to meteorology may like to compare the weather in England this last severe winter with that at Florence, I send you a summary of the imperfect register which I have kept at the latter place, without other instrument than a Fahrenheit's thermometer, and that usually observed but once daily, adding from my memoranda a few rough notes on different heads, not susceptible of being condensed into a tabular form.

	Nov. 18. to 30. 1829.	Dec.	January 1830.	Feb.	March.
Mean height of thermometer in the shade at 8 A.M.	42°	37°	34°	39°	48°
Highest point of thermometer at 8 A.M.	(25.) 53°	(3.) 49°	(24.) 45°	(28.) 50°	(26.) 57°
Lowest point of thermometer at 8 A.M.	(22.) 30°	(30.) 22°	(12.) 24°	(1.) 26°	(6.) 35°*
Days of bright sunshine	5	11	17	12	23
partially sunny and fair	2	5	4	5	3
cloudy and fair	1	5	5	5	5
rainy	5	10	5	5	—
snowy	—	—	—	1	—
Wind north number of days	—	13	6	1	—
north-east	5	8	9	6	3
east	1	1	5	2	1
south-east	—	2	2	3	4
south	4	—	—	—	—
south-west	1	5	4	6	22
west	2	1	—	2	—
north-west	—	1	5	8	1

Frost. — During the winter there have been four distinct periods of continued frost, as under: —

1. From Nov. 18. to Nov. 23. ice on ponds 2 to 3 in. thick.
2. — Dec. 26. — Jan. 18. — 6 to 7
3. — Jan. 27. — Feb. 10. — 3 to 4
4. — Feb. 14. — Feb. 18. — 1 to 2

In all, 48 days of frost. Between these periods the weather was open, but with slight frosts occasionally. The second and longest period of twenty-three days was interrupted by one day of rain on the 8th of January. Though the cold was once 22° (and probably lower in the night), no material injury was sustained by the bitter orange trees, *Nèrium* Oleánder, Agàve americàna, *Yúcca* aloëfòlia, one or two species of the hardier palms, &c., which are planted in the open ground without protection. The variety of Agàve americàna with yellow

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[*] The following account of the height of the thermometer in the shade, at different hours of one day, March 28., will serve to give an idea of the average daily variations of temperature towards the end of the month. Thermometer at 6½ A.M. 45°; at 9, 57°; at 4 P.M. 71°; at 7, 65°. In the full sun, March 29. at 3 P.M. 102°.

margins to the leaves is often planted with good effect in vases surmounting the pillars of gateways. Of these, some have the upper leaves killed, but many are little injured, though the roots must have been exposed to severe cold. The common myrtle, though a native of this part of Italy, is more cut by the frost than any of the exotic plants above named, and has suffered as much as it often does in Devonshire in severe winters.

Rain. — Deluges of rain, both heavier and of longer continuance than are usual in England, fell in the latter end of November and middle of December. Of these, taking the Arno as a rain-gauge, that which prevailed more or less from the 17th to the 21st of December was the most considerable. From the 21st of February to the 31st of March, some very slight showers excepted, no rain fell; whence resulted not pecks, but tons, of March dust, and the finest possible weather for pruning the vines, and working the vineyards and olive grounds, which entirely surround Florence for miles, and are almost wholly dug by hand.

Snow. — Some snow, mixed with sleet and rain, fell on the 9th and 17th of January, and on the 13th the roofs were covered half an inch deep for a few hours: but the only considerable fall during the winter was on the 4th of February, when the snow was 4 or 5 in. deep on the level; a greater fall than has occurred for eight or ten years, according to the Florentines, whose eager curiosity at every door and window to watch the descending flakes, showed that they do not witness this exhibition every year. The snow had disappeared from the middle (or second) range of Apennines surrounding Florence on February 25th, except drifted patches, a few of which still remained on March 27th, at which time the third or farthest range was still covered.

Fogs. — Florence has the reputation, in some books of travels, of being subject to fogs; but it has scarcely deserved this character the past winter; in which there were about eight days in which the mornings were foggy till ten o'clock, and then succeeded by bright sunshine, but not more than two days of continued fog.

Wind. — What is noted in the table as to the direction of the wind must be taken with some grains of allowance, as it is not always easy to be accurate on this point when residing in a city where, the fuel being mostly charcoal, you may look long without seeing smoke issue from a single chimney, and where, from its proximity to the Apennines, a superior current of air is not unfrequently directly contrary to that which prevails near the surface. This was the case for the whole of two days (Jan. 28. and 29.); the lower current being south-east or east, and the upper, as indicated by the course of the clouds, directly west. The highest wind was on Jan. 2., when, from five to eight P.M., it blew almost a hurricane.

Dryness of Air. — The superior dryness of the air in Italy in summer, compared with that of England and many parts of the north of Europe, is well known: but I was not aware that the difference is equally striking even in the rainy part of winter, judging, for want of a better hygrometer, from the condensation of moisture on the inside of windows in rooms without a fire; which I have always observed to be very considerable in winter, both in England, and also at Brussels during a three years' residence there, whenever a cold night succeeds a rainy or warm day, the condensed moisture often even running down to the floor: whereas at Florence, under precisely similar circumstances, I have never but once observed more than a slight condensation in the middle of the panes, as if breathed on, even in rooms with a north aspect; and only once during the frost, any appearance, and that but slight, of that thick crust of ice formed on the inside of the panes in England and at Brussels whenever a hard frost sets in. Among many other proofs of the greater dryness of the air in winter, one is afforded by the profusion in which grapes are to be had, at less than twopence a pound, at the corners of every street, up to the end of March, quite free from all mouldiness, though cut full four months, and kept merely by being hung at the top of rooms without a fire.

Progress of Vegetation, &c.—The effect of shade, in preventing, or rather neutralising, terrestrial radiation, was very strikingly exhibited in the Cascine (or park) at Florence, Jan. 22., after the second and longest frost. While all the rest of the surrounding exposed grass looked bare and withered, that under a group of old evergreen oaks had made a shoot of from 1 to 2 in., and was of a fine vivid green, distinguishable at a great distance. Groundsel, the daisy, shepherd's purse, *Verónica* arvénsis, Caléndula arvénsis, &c., in flower the whole winter, their blossoms expanding, during the frost, on bright warm days.—*Leaves half-expanded*, of elder and weeping willow, March 7.; hawthorn, March 12.; Cratæ`gus *Pyra*cántha *Lin.* (which, with blackthorn and *Pa*liùrus austràlis, chiefly forms the hedges round Florence), March 25.; elms (the lower branches), and Liriodéndron Tulipífera, March 27.; *Pa*liùrus austràlis, March 30. — *Wild plants in flower*, as under: — *O*'xalis corniculàta, January 28.; Cròcus biflòrus? (which covered a grass field of six or eight acres as profusely as Cólchicum autumnàle does some English meadows), Feb.

16.; Eránthis hyemàlis (a troublesome weed in the vineyards and olive grounds), Feb. 19.; *H*yacínthus racemòsus (which here replaces the hare-bell of Britain), Feb. 23.; pilewort, March 2.; violets (which are more abundant about Florence than I ever saw them anywhere), and primroses (less common), March 5.; *H*ellébórus víridis and *A*nemòne horténsis (both very common at the foot of the Apennines towards Fiesole), March 15.; *V*ínca màjor, March 24.; *La*ûrus nóbilis, March 28. — Standard peach and almond trees: a few flowers unfolded, March 9., but not generally in blossom until March 15., when, mixed with the blue-green olive trees, they made a glorious show; blackthorn, March 19.; pear and plum trees, March 27. Vine buds still apparently quiescent at the end of March, and, owing to the unusually backward spring, the pruning then not entirely finished, though the risk of the vines bleeding must be considerable, as the peasants seem well aware, judging from the five or six pruners now often hard at work in one vineyard.

Vanéssa Atalánt*a*, C. álbum, and other common butterflies, on the wing early in March. Bats flying, more or less, nearly all the winter, and often long before dusk. Lizards, of several species, swarming, from the beginning of March, by hundreds, on every bank. A tortoise, about 8 in. long, of a species common in Germany and Italy, kept in a neighbouring garden, awaked from its winter's sleep, and appeared above ground March 26., and was brought to us still encrusted with the earth out of which it had made its way. A single swallow was seen by my eldest son, March 16., but from that time none were visible till March 29., when they appeared in considerable numbers.

General Remarks. — The natives of Florence concur in calling the past winter the most severe which they have experienced for thirty years; yet, comparing it with my own recollections of former ones, of which six were spent in Devonshire, it has been the pleasantest I ever passed. The north winds from the Apennines, at its commencement, were high, and most piercingly cold, but afterwards the air was generally calm, and its coolness tempered by a bright sun, so as to be extremely agreeable; and the spring has been still more delightful, no rain, except two or three showers not sufficient to lay the dust, having fallen from Feb. 21. to March 31., of which thirty-eight days, the whole, with the exception of five cloudy ones, has been one uninterrupted period of sunshine and balmy breezes, mostly from the south-west, and quite equal to the finest May weather in England. Rain, however, now begins to be much wanted. I am, Sir, &c.

Florence, April 2. 1830. W. Spence.

PART II.

REVIEWS.

Art. I. *Deliciæ Sylvàrum; or Grand and Romantic Forest Scenery in England and Scotland.* Drawn from Nature and etched by Jacob George Strutt, Author of the *Sýlva Británnica.* London. Fol. Nos. I. and II.

The forest scenery of Great Britain constitutes one of the noblest ornaments of our island, and one, moreover, of that peculiar kind, which it is least within the power of art to create suddenly and at once. Stately edifices may be erected, gardens laid out and enriched with the choicest gifts of Flora, fountains and expansive lakes may be formed and brought to perfection in the space of a comparatively short time, by any one who, together with the inclination for such undertakings, possesses the command of wealth: but ages and generations must pass over before a single oak tree can arrive even at maturity, much less at that stage of growth, or rather of decay, in which its genuine beauty and magnificence are best developed. We apprehend that the age of our venerable stag-headed oaks is much under-rated by the generality even of intelligent persons. As to the opinion so commonly broached, that a oak is a hundred years in coming to perfection, a hundred in what may be called the vigour of life, and another hundred in decay, it is, we feel confident, a mere vulgar error, and does not hold true in any one part of the assertion. The Tortworth Chestnut (of whose existence as a large and notable tree so far back as the reign of King Stephen there is historical record), it has been calculated, is not less than eleven hundred years old. "And if we consider," says an intelligent writer *, "the quick growth of the chestnut compared with that of the oak, and at the same time the inferior bulk of the Tortworth Chestnut to the Cowthorpe (see Vol. I. p. 247. fig. 102.), the Bentley, and the Boddington Oaks, may we not venture to infer, that the existence of these truly venerable trees commenced some centuries prior to the era of Christianity?" We can readily subscribe to this doctrine; and feel, indeed, quite at a loss to set limits (under favourable circumstances) to the natural duration of this monarch of the forest.

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* See *Planting and Ornamental Gardening, a Practical Treatise.* Published by Dodsley, 1785.

A fine picturesque oak is perhaps the most beautiful object in nature. And here we would entreat all such as are so fortunate as to be the possessors of these "venerable and living antiquities of nature," not to mutilate their forms and destroy their character by cutting out as unsightly objects, the raunpikes, or rampikes as they are called, that is, the dead and denudated arms, that have endured the blast of ages, — a practice which we are sorry to see adopted in the parks of some of our nobility and gentry, and of which the example is set even in the royal domain at Windsor. The bold projecting limbs, now "blasted with antiquity," though no longer adorned with rich and verdant foliage, still add greatly to the grandeur and picturesque effect of the tree; they preserve the proper balance of the parts, which is consequently destroyed by their removal, and serve as memorandums of its pristine vigour, to define the original outline and extent of the whole; the imagination supplying to the mind what is no longer actually visible to the eye. We should as soon think of removing some ivy-mantled turret, or mouldering moss-grown buttress, from an ancient castellated ruin, with a view to improve its beauty, as of depriving our oaks of their raunpikes, and "curtailing them of this fair proportion."

Delighting as we do in our "old patrician trees," it is never without regret that we see the woodman exercising his craft upon them, or hear the sound of the axe echoing through the grove. The demands of the state, however, — the cupidity, the extravagance, or, perhaps, the bad taste of landed proprietors, — the blasting and tempestuous elements, — or, lastly, the unsparing hand of time, — some or all of these are causes perpetually in operation to ravage the forests and despoil the country of its ornamental timber. It is therefore with no ordinary satisfaction that we hail Mr. Strutt's successful attempt to portray some of the choicest specimens of our forest scenery, and leave to after-ages a memorial of them,

—— "Quod nec Jovis ira, nec ignes,
Nec poterit ferrum, nec edax abolere vetustas."*

Mr. Strutt is already known to the public, not only as an elegant and accomplished scholar, the translator of *Clau-*

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* —— "Which, Jove's rage,
Nor fire, nor sword shall raze, nor eating age."
Ovid's Met. (Sandys's translation.)

dian[*], and of the Latin and Italian poems of Milton, and as a landscape-painter, but also more particularly as the author of *Sýlva Británnica, or Portraits of Forest Trees distinguished for their Antiquity, Magnitude, or Beauty.* We have a remark or two to make relative to this last-mentioned work, before we proceed to that which stands at the head of the present article. The two publications are of the same size, and of congenial character. Several, indeed, of the subjects in either work might without impropriety have found a place in the other. It is to be regretted, we think, that the *Sýlva Británnica* was not enlarged to double its extent, or more, so as to have included portraits of all the more remarkable trees still remaining throughout the country, — trees, we mean, either connected with some historical fact or tradition, commemorative of some illustrious personage, or themselves remarkable for their size, beauty, or extraordinary growth and conformation. We should like to have had a complete collection of such trees. It is not very probable that any other person should now commence a work on an exactly similar plan; and if it were undertaken, we much doubt whether it would be executed with an equal degree of taste and ability. Mr. Strutt's plates are etchings of a folio size, and of a very superior order. There is no journeyman's work in them; but, having been executed entirely by his own hand, they possess the freshness, spirit, and freedom of original sketches from the pencil of a master, and have lost nothing by evaporation from being transferred from the drawing to the copper. They have the merit too — a merit but seldom aimed at even by painters — of depicting, and in most cases with great precision, the true characteristic features of each species intended to be represented. The trees figured proclaim their own kind: they are oak trees, ash, beech, yew, &c., and not only so, but faithful portraits of individual specimens of each. In expressing the foliage of the oak, and its contorted branches, the touch of the artist is peculiarly happy. We happen to know that the author was strongly urged by several of his subscribers to extend the *Sýlva Británnica* by the addition of some extra-numbers; and there is reason to believe, that had he consulted either his private inclination or his own pecuniary interest, he would readily have complied with the request. His refusal to do so is, we suspect, to be attributed to feelings of delicacy towards his subscribers. He had in the outset engaged to complete the work in twelve numbers, and he judged that he should not be fulfilling his engagements and keeping faith with the public, if he exceeded that quantity. Thus finding himself, therefore, "spatiis exclusus iniquis *," he declined complying with the urgent solicitations of some, at the risk of offending others. We are the more inclined to attribute his refusal to some such honourable motives, from the very handsome manner in which the work was conducted throughout from the beginning, and finally brought to a close. A progressive improvement in the plates was visible in each succeeding number. There was more of finish in the execution, more labour expended, more light and shade, more pictorial effect, in the latter than in the earlier etchings. And, to the credit of Mr. Strutt, it ought not to be forgotten that, when the concluding number came forth, each subscriber was presented with two extra-plates, a frontispiece and tailpiece, of equal size with the rest, without any additional charge being made for the over-weight. This certainly was making his bow in the most handsome way to those who had encouraged his undertaking. By such liberal conduct we hope and trust he will be no loser; as it may serve as a pledge and earnest to the public, that they are safe in his hands, and run no risk of being shabbily treated by him in his present or any future publication.

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[*] This translation of select poems from *Claudian* is a work of great merit, and by no means so well known as it deserves to be. It was published in 1814, and sold by Messrs. Longman.

We now turn to the work more immediately before us, the *Delíciæ Sylvárum, or Grand and Romantic Forest Scenery in England and Scotland.* The contents of the two numbers already published do not disappoint the expectations raised by this imposing title. In the *Sýlva Británnica,* from the very nature of the undertaking, the portraits of single trees now and then presented rather stiff and formal subjects, and were in some few instances unavoidably deficient in picturesque beauty. The plates in the present work are not liable to the same objection, being all of them in perfect accordance with the best taste of the landscape-painter, and in point of execution equal or superior to the very best etchings in the former work. The frontispiece, which is extremely appropriate, is a plate of great merit. Mr. Strutt has not thought well to tell us where the scene is to be met with, or whether it has any existence in reality; we presume, therefore, that it is a composition. At the same time, we could almost fancy that we had, during our summer rambles in a midland county, ourselves seen the identical old oak (*fig.* 100.), with its dragon claws casting anchor in the rock below, which forms the more prominent object in the plate. Be this as it may, however,

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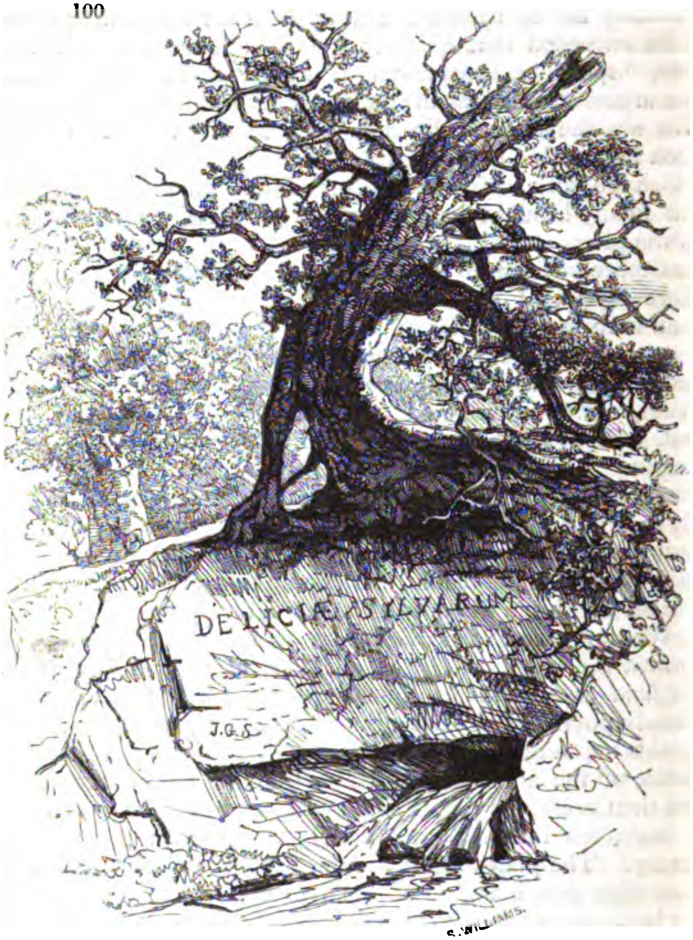
* "In narrow bounds confined."


100
DELICIÆ SYLVARUM
J.G.S.
S. WILLIAMS.

we feel confident, and stake our credit on the assertion, that the tree in question, if not an actual portrait, has at least its prototype in nature, and is not a mere invention of the artist manufactured in his painting-room in Duke Street. If we mistake not, Mr. Strutt is more of an out-of-doors artist than some of his fraternity; we mean that he is in the habit of sketching much, and even painting, in the open air. From a close and repeated inspection of his works, both on canvass and on copper, we apprehend that he studies Nature above and before all other models, and looks upon her as a surer guide to excellence than even the best of the old masters.

We are far from meaning in the least degree to detract from the merit of our Claudes, Ruysdaels, and Hobbimas (on the contrary, we have them in the highest esteem), or to deny the utility of their works in correcting the taste and guiding the execution of modern painters. Nevertheless we would not wish to see these heroes of former days, eminent as they were in their profession, too servilely copied, or too exclusively attended to. Art may be carried too far. It is very possible and very common to study pictures more than nature; almost, indeed, to the utter exclusion of the latter. Was it not by a close application to the study of nature that the old masters themselves attained to eminence? The modern aspirant after fame, therefore, should pursue the like course; and "with all appliances and means to boot," which are fairly to be derived from an inspection of the works of his predecessors, let him go in the first instance to the fountain-head, and study Nature for himself, instead of taking up with her beauties at second hand, and viewing them, as it were, through the eyes of another. We could expatiate on this subject, but our limits warn us to forbear.

The first number of *Deliciæ Sylvarum* contains, besides the frontispiece already spoken of, four plates, the full complement of each number, representing, respectively, scenes from Windsor, Epping, and Marlborough Forests, and one view near Chepstow. Among these we decidedly give the preference to the genuine forest views. The oak in the Epping plate, with its foreshortened arms, the brilliant spring of water at its foot, and the weeds in the fore-ground, demand our unqualified praise. We have one fault, however, and but one, to find with this beautiful plate. The head of the tree, in the middle of the picture towards the top, is heavy, lumpish, and too unlike foliage; nor is the outline of it good. We are quite sure that, with a little care, Mr. Strutt could have managed this part of the etching better, since, as we have already remarked, he excels in depicting foliage, and especially the foliage of the oak. The fault complained of is owing, we conceive, to some alteration having been made in the plate, after the design was etched on the copper, of which alteration we fancy we can perceive evident traces. One or two other instances of a similar kind might be pointed out in some of the other plates; and we mention the circumstance the rather, not in the spirit of severe criticism, but in the hope that Mr. Strutt will take care to avoid inflicting on his plates the same kind of blemishes in future. The more complete he has his design at the first, and the fewer alterations he makes with the scraper and burnisher after the acid has once been applied to the copper, the better. At all events, if he thinks well to make any material alteration in a plate, the portion of work which it is wished to erase should be erased thoroughly, and not left as a blot to mar the fair beauty of the whole. Had our artist more scrupulously attended to this rule, we should not have had to lament the imperfect apparition of a waggon and horses still visible in the next plate we shall notice, which represents a scene from Marlborough Forest. We have here a portrait of a beautiful and extraordinary oak (*fig.* 101.), which, we are

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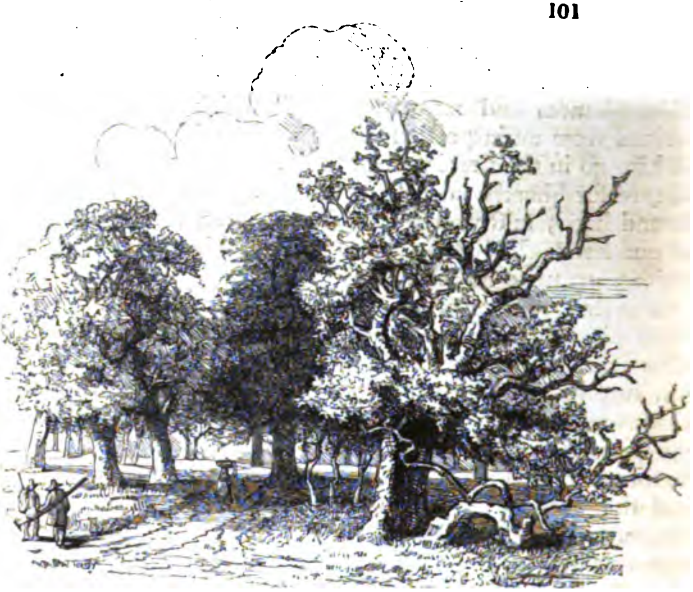

informed, "from a large portion of its branches scarcely lifting themselves off the earth, is known by the name of the creeping oak." This tree ought by all means to have found a place in the *Sýlva Británnica*, and would have made an appropriate companion to the king oak (*fig.* 102.), standing in the same forest, and of which a portrait is given in that work.

We pass on to the second number, in which we find the wild and romantic Linn of Dee in the forest of Brae-mar Scotland, the Burnham Beeches, and two scenes in the Forest of Arden. Of these plates, which are all good, we admire most the two former, on account of the superior brilliancy and sharpness of the etching; and particularly that of the Burnham Beeches. We can speak to the accuracy of this plate as a view, having ourselves sauntered with infinite delight in this

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sequestered spot, which recommends itself to our notice as well by its own intrinsic beauty, as by the circumstance of its having been, as Mr. Strutt informs us, the favourite haunt of the poet Gray, and "the scene of his poetic musings." This charming tract of woodland, which is of considerable extent, lies only a few miles from Stoke Pogis [*], in Buckinghamshire. It possesses sufficient inequality of ground and variety of surface to give additional interest to the sylvan scenery. The oak, the birch, and the holly contribute their shades; and the native juniper, a local if not a rare shrub, flourishes here in profusion, and casts a dark and sober-coloured mantle over the whole landscape. But that which constitutes the peculiar feature of the place, and marks its character, and from which, indeed, it derives its appellation, is the beech,

> "That wreaths its old fantastic roots so high,"

and appears to be the staple growth of this part of the country. These trees are of great antiquity, and many of them of a large size; and, having been pollarded or lopped, most probably for fuel, at some remote period, have since been suffered to grow and take their own course, unmolested by the axe, and now assume the wildest forms, occasionally presenting almost a grotesque appearance. Their roots especially are in many instances of a very large size, and extraordinarily picturesque; the clefts or interstices between their separate divisions will be found on admeasurement in some cases to exceed a yard in depth. We know of no place that we would sooner select for the purpose of taking up our abode for a week in the summer, and pitching our camp, gipsy-like, "patulæ sub tegmine fagi," to ramble about at leisure, and enjoy the pure charms of nature, than the Burnham Beeches. Not only the lover of forest scenery and of the beauties of nature in general, but the botanist and the entomologist, would each of them here find an ample field for his pursuits and a rich remuneration for his labours.

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[*] In the church-yard at Stoke, which probably suggested the idea of his celebrated elegy, the mortal remains of the poet are entombed.

Of the two scenes in the Forest of Arden much might be said in praise, though the plates are, as we have said, in point of brilliancy of etching, not quite equal to their companions in the same number. This partial inferiority is owing, we apprehend, to a want of equal success in the operation of *biting in*, — an operation which, while it requires much skill and experience in the artist, depends, after all, in some degree, on chance, or at least on circumstances over which the operator has not the entire control. Independently of the strength of the acid employed for the purpose, the state of the atmosphere, the temperature of the room, and, above all, the due admixture of the metals of which the plate is composed — all or any of these will make a material difference.

"The very name of the Forest of Arden," observes our author, "conjures up in the mind of the English reader a thousand poetical images; for he involuntarily links it with Shakspeare's muse; peoples it with banished lords; listens in imagination to 'the moralising of the melancholy Jaques,' and longs to find out the individual oak

> —— "'Whose antique roots peep out
> Upon the brook that brawls along this wood:
> To the which place a poor sequester'd stag,
> That from the hunter's aim had ta'en a hurt,
> Did come to languish.'

"It is, however, too often the unwelcome province of the historian and topographer to destroy the associations with which fancy loves to deck a favourite scene, by showing the fallacy on which they are founded." Accordingly, the Shakspearean Forest of Arden, it is almost unnecessary to state, is to be sought for in foreign, not in English, soil, and is no other than the Ardennes of our Gallic neighbours. With respect to the Warwickshire Arden, little or nothing is known on the subject. That it ever had any claims to the name or legal character of a forest, as Mr. Strutt, on no better authority than the poet Drayton, leaves us to infer, we very much doubt, or rather entirely disbelieve. To some this may perhaps appear a startling assertion; however, it is not hastily made. "Arden" is supposed by Whitaker to mean a great wood; and there can be no doubt that a certain district in Warwickshire, comprehending probably the Woodland in opposition to the Feldon, was so called; from whence Turkil de Arden acquired his appellation, and the distant vills of Weston in Arden and Hampton in Arden their adjunctive distinction; but that its magnitude corresponded with the poet Drayton's verse, as quoted by Mr. Strutt,

"Her one hand touching Trent, the other Severn's side,"

is not to be believed for a moment; nor dare we place any more reliance on the "Map of the Arden," in Bartlett's *Manduessedum.* That the district in question was woodland generally, is clear from the circumstance of lands in the time of Henry the Third being sold "per magnam mensuram de Ardenne," the woodland measure long continuing to be larger than that which was applied in meting other lands. There are, indeed, smatterers in antiquarian lore, who scruple not to maintain that the present names of certain parishes in Warwickshire still serve to point out the boundaries of the ancient Forest of Arden. Thus they assert, and so far assert truly, that there runs through a portion of the county, commencing from the north, and extending in a south-easterly direction, an uninterrupted line of parishes, the names of which terminate in "ley," as, *e. g.* Badesley, Baxterley, Ansley, Arley, Astley, Fillongley, Corley, Allesley, &c. And these, we are required to believe, constituted what they choose to call the *ley* or *lay* lands of the forest, situate on its outskirts, meaning by that term the cultivated lands, or those employed for agricultural purposes, in contradistinction to the uncultivated or woodland tracts. All this, we hesitate not to say, is in our opinion mere antiquarian quackery; the termination of these names having about as much to do with defining the boundaries of the forest as it has with determining the source and direction of the mysterious Niger. The truth, we believe, is, as we are compelled to state, and have above pretty broadly hinted, that the Warwickshire Forest of Arden never was, in fact, any forest at all; but that the district, being generally woodland (as already stated), acquired the appellation of forest in contradistinction to the more open country.

We beg pardon of our readers for having detained them so long in the forest, and with (we fear) such dry and unpalatable fare. We thought it not unimportant, however, to expose the fallacy of an opinion, which seems to be wide spread and deep rooted. People talk of the Forest of Arden, and, caught by the sound of the words, without the least enquiry, take up with the belief, that in the olden time the lands had a legitimate right to that character which the name implies. *Οὕτως ἀταλαίπωρος τοῖς πολλοῖς ἡ ζήτησις τῆς ἀληθείας, καὶ ἐπὶ τὰ ἕτοιμα μᾶλλον τρέπονται.*[*]

Quitting at length the intricacies of Arden, we now hasten to a conclusion, observing, as we pass, that each subject of the *Delíciæ Sylvàrum* is accompanied by a small portion of descriptive letter-press, interspersed and enlivened with appropriate quotations, both poetical and prose. The account, by John Taylor the water-poet, of the extensive and magnificent huntings, which formerly took place in the Forest of Brae-mar, is highly curious and interesting. Did our limits permit, we would gladly extract the passage; but, having already trespassed on the patience of our readers, we refer them to Mr. Strutt's own pages, and shall content ourselves with observing generally, that the descriptive part of the work before us, brief as it is, is in unison with the pictorial, and just what might be expected from a man of Mr. Strutt's known taste and acquirements. In one instance, however, our author commits a strange blunder: at the end of his introduction he employs the word "*accorded*" instead of what, we feel assured, he meant to have written, "*awarded:*" a mere *lapsus* this, inadvertently made in an unguarded moment, which we notice chiefly with a view to convince our readers, that, however lavish we may appear to have been in our praises of Mr. Strutt and his performances (and we certainly do think very highly of them), we are ready at the same time fairly and fearlessly to point out any the most minute blemishes we can detect in the execution of his work. We now take our leave of Mr. Strutt, heartily wishing that he may meet with that liberal support and encouragement from the public, which in our conscience we think he so well deserves. To every lover of forest scenery, to every admirer of pure and spirited etchings, we confidently recommend the *Delíciæ Sylvàrum*, venturing to predict that the work will be handed down to posterity, and remain *κτῆμά ἐς ἀεὶ*[†] long after the charming scenes it portrays shall have mouldered into decay.

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[*] "So impatient of labour are the most men in search of truth, and embrace soonest the things that are next to hand."—*Thucydides*, b. i. (Hobbes.)

[†] "For an everlasting possession."

P. S. — We think it but justice to inform our readers that the three wood-cuts which accompany the present article are miniature sketches, by Mr. Williams, from Mr. Strutt's original etchings in the *Deliciæ Sylvàrum* and *Sýlva Británnica.* These two artists work admirably well in couples; an assertion in which, we think, we are borne out by an inspection of the vignettes themselves, as well as of similar specimens from the same source in former Numbers of the Magazine. To Mr. Strutt is due the merit of having made the sketches, and drawn them with pencil on the wood; and to Mr. Williams that of having most successfully executed the blocks so traced by his coadjutor. We avow ourselves great admirers of the xylographic art; and among all its professors we know of few who equal, of none who surpass, Mr. Williams; for executing sylvan subjects he stands, we think, unrivalled in this department of the fine arts. — *A. R. Y.*

Art. II. *Life of Sir Humphry Davy.* By Dr. Paris. In the Annual Biography and Obituary for 1830.

The lives of men of transcendent talents and genius, who have raised themselves from the humble walks of society to distinguished eminence, offer some of the most useful examples which biography can record, as they afford encouragement to intellectual exertion, when deprived of the adventitious aid of family consequence, and an expensive education. Any attempt to disguise the real circumstances under which the early lives of great men have often been passed, and to represent them as more dignified than they really were, may be compared to smearing a beautiful statue of Parian marble with paint, and clothing it in a court dress.

We have been led into these remarks, by perusing the life of Sir Humphry Davy in the *Annual Biography and Obituary for* 1830. The writer of the article has given a very luminous and masterly sketch of Sir Humphrey Davy's scientific discoveries; but, not content with claiming respect for him as a philosopher, he would increase our veneration for him on account of the gentility of his family. "The name of Davy," he informs us, "is of ancient respectability in the West of England; his father, Robert Davy, possessed a paternal estate opposite to St. Michael's Mount, called Bartel, which, though small, was amply competent for the supply of his limited desires. It is, therefore, probable that his profession, which was that of a carver in wood, was pursued by him as an object rather of amusement than of necessity; although, in the town and neighbourhood of Penzance, there are many specimens of his art; and, among others, several chimney-pieces curiously embellished by his chisel." Had the writer stated that Robert Davy was an honest industrious man, the praise would have been better understood in Penzance, where, as we have been informed, he was best known by the title of "Little Carver Davy;" and Sir Humphry, when young, was always spoken of in the place as "Carver Davy's boy;" and under this title, we believe, he was first introduced to Mr. Davies Giddy, now Gilbert, President of the Royal Society. Dr. Southey, in his life of Kirke White the poet, informs us that he was the son of a butcher at Nottingham. He might have added, with truth, that Mr. White, the butcher, was possessed of some landed property; but Dr. Southey had too much respect for the understanding of his readers to tell them, "It is probable that Mr. White slaughtered oxen, calves, and sheep, rather for amusement than from necessity, though he constantly supplied many families in Nottingham and its vicinity with meat, and was particularly distinguished for the excellence of his veal." Some persons have such a fastidious taste, that they would have all eminent discoveries to be made by gentlemen, or men who have had a university education; but the history of philosophy will inform us that four fifths of the most important advancements in science have been made by self-taught men, the children of parents engaged in useful trades or occupations. Indeed, except mere book learning, no education is available for the promotion of science but what every man gives to himself; and it has been recently stated, with much truth, that Sir Isaac Newton was made the greatest of natural philosophers, not by Cambridge, but by himself; and it is even doubted whether he derived any substantial benefit from his university education, though Dr. Barrow was then one of the professors.

With the domestic concerns or private foibles of men who have conferred an honour on their country, the public have nothing to do; but, if allusions be made to them, we have a right to expect that the words should convey a correct representation of facts. The high praise bestowed on Lady Davy we fully believe to be justly merited: the very circumstance of her going to join her husband on his travels, during his last illness, would alone afford sufficient proof of this; but while the biographer speaks of the "inestimable treasure of an affectionate and exemplary wife, and a congenial friend and companion," does he not, by the mention of these qualities, excite recollections which the best friends to the memory of this eminent philosopher would desire to be buried in oblivion? The biographer, as well as the historian, who writes immediately after passing events, has sometimes a difficult task to perform, if he departs from an unvaried and unmeaning strain of eulogy in describing his characters; but he who undertakes to write the life of such a man as Sir Humphry Davy, should recollect that, if the task be well executed, he is not writing for the present age alone, but for posterity: and, if he descend to details of the philosopher's family, and of his manners, habits, and *opinions* *, the only value such details can possess will be from their verisimilitude. Indeed, without this verisimilitude, private biography, as is too frequently the case, is nothing but a "cunningly devised fable," intended to mislead, and not to instruct. We have been more copious in our remarks, because it is announced that the same gentleman who wrote the article of Sir Humphry Davy is preparing for publication a full life of this eminent philosopher. From the able and perspicuous sketch of his discoveries given in the *Obituary*, the writer has proved himself well qualified for the undertaking: we have no doubt that the work will be worthy, in this respect, of the subject; and we should be sorry to see it disfigured by any instances of bad taste or affectation.

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* Dr. Paris says something about the "spawn of infidelity," and seems to wish, by implication, to puff off Sir Humphry Davy's piety: his *real* sentiments on religious subjects were well known to his intimate friends. The inference which Dr. Paris would wish his readers to draw respecting the domestic life of the philosopher is, that Sir Humphry Davy and his lady lived in a state of the highest connubial felicity. On this subject he had done much better to have maintained silence. — *L. H.*

Davy "hearing, while at Gottenberg, that Berzelius was in the south of Sweden, he wrote him, desiring he would not leave Helsingborg till a certain day, where he would meet him. Accordingly, Berzelius, with Orsted, and, I believe, Brongniart, were there at the time, and waited two days beyond it; till the two latter lost patience, and set off; and Berzelius had his horses in his carriage when news was brought that the Englishman had arrived: and, when they met, Davy's excuse was, '*that he had found such capital fishing by the way, that he could not think of leaving it.*' The waiting and the excuse, conjoined with the hauteur which, in later life, made Davy forget most of his old friends, and his old friends dislike him, were sufficient to create an unfriendly feeling: so, after spending four hours together, they parted. 'Any degree or mark of respect I was disposed to give him, as a great philosopher,' said Berzelius: 'but it was a pity to see a mind like his stoop to the demand of deference as a man of the world.'" (*Johnston*, in *Brewster's Journal*, April, 1830. p 205.)

PART III.

MISCELLANEOUS INTELLIGENCE.

Art. I. *Calendar of Nature.*

Scotland.

Diagram, showing the Motion of the Mercury in the Barometer and Thermometer, and the Dew Point, or the Mean of each, for every Ten Days in the Months of April and May; also the Mean Temperature of the Air within 6 in. of a South Brick Wall, the Thermometer being shaded; the Depth of Rain in the Pluviometer, and the Quantity of Moisture evaporated in the Evaporating Gauge, during the same Period; as extracted from the Register kept at Annat Gardens, Perthshire, N. Lat. 56° 23½′, above the level of the sea 172 ft., and 15 miles from the coast; being the mean of daily observations at 10 o'clock morning and 10 o'clock evening.

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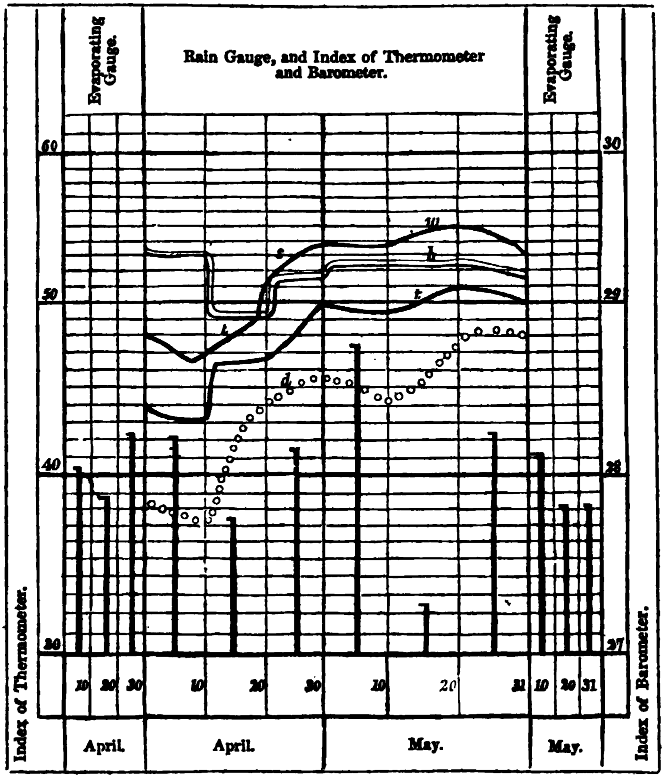


The lines marked *b* show the motion of the mercury in the barometer; *t w* the mean temperature of the air near a south garden wall; *t* the mean temperature in the open air, and in the shade; and *d* the dew point.

The coldest day in April was the 2d: mean temperature of that day 34°, extreme cold 22°, wind east. The warmest day in that month was the 30th: mean temperature of that day 53°, extreme heat 65°, wind south-east. There were only 4 days of brilliant, and 10 days of partial, sunshine; 16 days were cloudy. The wind blew from the east and north-east on 11 days, from the north and north-west on 8 days, and from the west and south-west on 11 days: there were moderate gales of wind from the north-west on the 25th and 26th.—The coldest day in May was on the 10th: mean temperature of that day 42°, minimum temperature 35°; wind easterly. The warmest day in that month was the 6th: extreme heat 64°; wind east. There were 6 days of brilliant, and 9 days of partial, sunshine; on 16 days the atmosphere was cloudy. The wind blew from the east and north on 18 days, from the west and south-west on 13 days. There were loud gales of wind from the west on the 2d and 3d, and from the east on the 8th and 9th.

The month of April commenced with keen frost, which lasted four days, and did much hurt to early blossoms, which the unusually high temperature towards the end of March had brought forward. The flowers of gooseberries were fully expanded by the 6th, at which time green gage plums on south walls were in full blossom, 23 days earlier than last year. The larch was in leaf on the 8th. The crown imperial was in flower in the border on the 9th, and the leaves of the hawthorn were expanded on the 10th. The O'xalis Acetosélla (wood-sorrel), a plant supposed by some to be the Irish shamrock, opened its little flowers on the 17th. On the evening of the 19th, about half-past 10 o'clock, the Aurora Borealis appeared unusually brilliant, and continued with increasing splendour about three hours and a half. This phenomenon is usually the precursor of dropping weather, and was in the present instance followed by frequent and heavy rains, till the 25th. On the 20th, the wild geese, which had taken up their winter quarters in the Carse of Gowrie, began to exercise their wings in short excursions previously to their setting out to the north coasts; swallows were first seen on the 24th. Oats brairded on the 24th, which had been sown on the 7th, a period of 17 days: mean temperature during that period 47°. On the 27th the maple and horsechestnut were in leaf. The Crawford and Green Chisel pears on standards were in flower by the 24th; the Galston Muirfowl Egg, and Benvie pears on the 27th; the genuine Golden Knap on the 28th, and the Longueville on the 30th; by which time the lime and birch were in full leaf, and wild geese had departed to their summer residence in the north. The mean temperature for April, notwithstanding the four days of severe frost at its commencement, was 46·7°, or 1° higher than on an average of seven years, and 4° higher than last season. Young crows were coming out on the branches by the end of the month.

At the beginning of May, vegetation was as far advanced as on an average of seasons. The summer snowdrop, which last year came in flower on the 11th, was this year in flower on the 1st of May; Morello cherries and Virginian strawberries were in flower on the 5th. The cuckoo was heard on the 5th. This bird seems to keep dates, without reference to temperature: it is usual to hear his first call on a rainy day, but this year there was no "gowk's speat" to usher him in: he was first heard in Lancashire on the 27th of April. (Report, *Country Times.*) Beech was in full leaf by the 6th. Barley sown at Annat Park on the 27th of April gave a braird on the 6th, a period of 9 days; mean temperature of that period 52°: under a temperature of 43·3°, barley requires 14 days in the ground. (Vol. II. p. 285.) On the 8th a violent east wind was accompanied with a heavy fall of rain, amounting in 14 hours to 1·7 in., and under a temperature of 42°. The foliage on the eastern or exposed side of larch plantations was shrivelled by the blast, and still retains a withered appearance. Codlin, Eve, and Orange Pippin apples were in flower by the 11th, but many of the blossoms had been destroyed by the tempest on the 8th. The landrail was heard on the evening of the 12th. Grey Leadington apples were in full flower by the 16th, the narcissus on the 17th. This flower has appeared about 10 days earlier this year than usual, and as much out of its ordinary place in the march of vegetation. Can its progress have been accelerated by the unusual quantity of moisture in the soil? The lilac came in flower on the 18th. The oak was in leaf on the 20th. The walnut and fig have been retarded to a later period in opening their foliage than is natural to these plants, by reason of the buds on the extremities of the shoots having perished by the frosts in the beginning of April. A profusion of small side buds have in consequence been protruded, and the walnut came in leaf on the 29th, and the figs on south walls on the 31st. The pupæ of the wheat-fly are numerous in all fields where wheat stood last season. Their transformation seems to be hastened by elevated temperature; some of the pupæ were enclosed in a glass phial amongst moistened earth about the middle of March, and the phial placed in a hotbed. The flies appeared in full wing and vigour on the 15th of May; those in the ground appear animated, and larger than when they dropped from the ear. When exposed to light, they have a slow undulating motion, as if still half asleep; the joints or rings become beautifully transparent, and the usual sulphur colour is changed into a light or whitish yellow. If they happen to come into the fly state about the middle of June, their depredations on the unfolding ear of wheat will prove seriously injurious to the farmer. The mean temperature for the month of May was 50·5°, or exactly 1° lower than on an average of the seven past years.—*A. G.* *May* 31. 1830.

THE MAGAZINE

OF

NATURAL HISTORY.

SEPTEMBER, 1830.

Art. I. *Remarks on the Natural History of the Parish of Slapton, near Dartmouth, Devonshire.* By H. V. D.

Sir,

Encouraged by your ready insertion (Vol. II. p. 143.) of my communication on the natural history of that portion of the genus *Scólopax* that fell under my own immediate observation, I am induced to offer, for the use of your valuable Magazine, such remarks on the natural history of the parish of Slapton, in Devon, as may at various periods present themselves to my notice. My former communication was made to you from the county of Norfolk, where I had for many years attentively observed and registered the habits and migrations of our winter visitants of that natural family. The parish in which I now reside will, I expect, afford me opportunities to fill up the chasms, and supply the information deficient in my former letter, with regard to the movements of this tribe, interesting alike to the naturalist, the sportsman, and the epicure.

The parish of Slapton is situated in that part of Devon denominated the South Hams, remarkable for the temperature of its climate, the fertility of its soil, and the salubrity of its atmosphere. The district of the South Hams is bounded on the north by the mountainous tract of Dartmoor, on the east and south by the English Channel, and on the west by the river Tamar. The parish itself is bounded on the north by that of Blackawton, on the east by Start Bay, on the south by Stokenham, which parish, with that of East Alvington, forms its western boundary. It is in latitude 50° 15′ south, in longitude 3° 30′ west, six miles distant from the port of Kingsbridge, and about seven from that of Dartmouth. Totness is the nearest place through which a London coach passes, which is about thirteen miles hence. It is, therefore, seldom visited by persons from the metropolis, or, in short, by any travellers. The manners of its inhabitants are in consequence very unsophisticated: they are kind and hospitable beyond what we meet with in more polished society.

The whole of the neighbourhood is situated upon an argillaceous slate, which, in this parish, principally dips to the S.E. This slate is in most places regularly divided by narrow veins of white flint, called by the inhabitants Whitacre stone. In the north part of the parish, where the land is high, this stone much abounds, and the soil from that cause is poor and sterile. The greatest part of the parish consists of clay slate, which, when decomposed (as it does readily), forms good corn land, and produces fine orchards. On the N.E. corner, the slate is surmounted by a red sandstone, on which is found some of the finest pasturage in the district. The land is principally cultivated in pasture, some corn land, and orchards; with but little wood, except Slapton Wood, which contains about 50 acres, and a few small coppices.

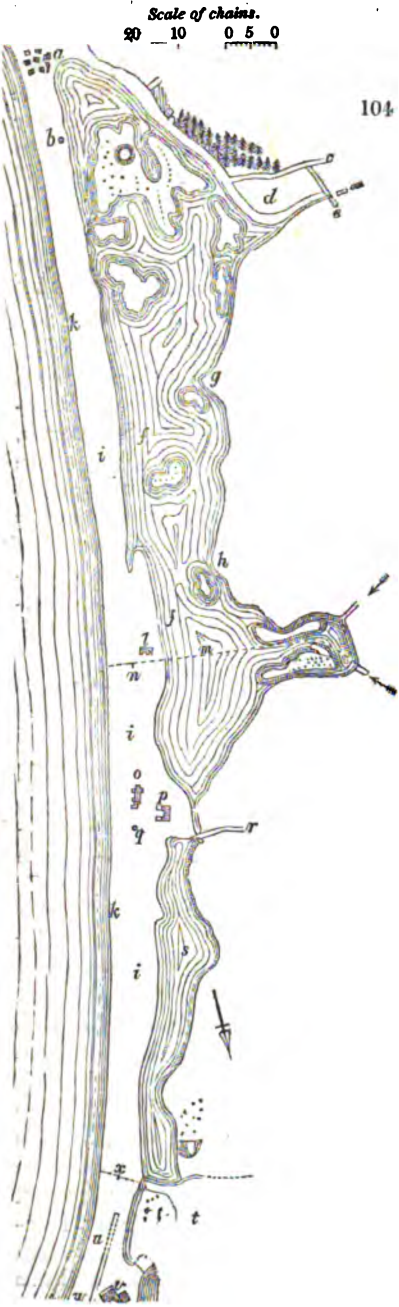
There is an extensive piece of water, called Slapton Lea, or Ley, connected with which are several circumstances interesting to the naturalist. It is situated in the parishes of Blackawton, Slapton, and Stokenham. Its length from Streetgate, in the parish of Blackawton, on the north, to Torcross on the south, is 2 miles 3 furlongs; the greatest width is about the third of a mile; and it contains rather more than 207 acres. It runs parallel to the shores of Start Bay, from which it is separated by a low narrow sand-bank, called Slapton Sands, the greatest width of which is 165 yards, the least 77 yards. It is fed by three small rivulets: one runs into it at the north, or Streetgate end, and is the most considerable of the three; another empties itself about the middle of the Ley; and the smallest at the south, or Torcross end. In the language of the South Hams, these small streams, mill streams, and even the gutters by which the pastures are irrigated, are, by a strange perversion of terms, called *lakes*.

The water thus accumulated forms the Lea, which has no visible outlet into the bay, and discharges itself by percolating through the sand. At about a mile from Streetgate, the Lea is crossed by Slapton Bridge, which divides it into two parts: the part north of the bridge is called the upper, containing rather more than 23 acres; the south portion, the lower Lea, containing 184 acres. The upper Lea is entirely overgrown by the Arúndo Phragmìtes, Scírpus lacústris, Spargànium ramòsum, S. eréctum, and similar aquatic plants. Through these reeds, &c. (in which are bred great numbers of wild ducks, coots, dabchicks, water hens, water rails, &c. &c.)

runs, in a defined channel, the upper streamlet or lake; which, passing under Slapton Bridge, unites its waters with those of the lower Lea. This, the larger portion, is open water, with the exception of reeds, &c., growing near the shore; and especially at the end near Torcross. In the lower Lea are likewise bred great quantities of water-fowl; and in severe weather, such as we had this winter, its surface is covered with wild fowl of every description, which will afford me ample subjects for my future communications.

With regard to the fish contained in this water there arises a paradox, which I am not Œdipus enough to solve. I visited Devonshire about seven years ago, for the benefit of my health: I amused myself, as my strength recovered (which it did with surprising rapidity), with my fly-rod, catching trout in the rivers in various parts of this delightful county. I enquired in every place where I angled concerning pike, perch, roach, and dace, which had been the objects of my sport in the eastern part of the kingdom; but I could not hear, from the various persons I fished with, the least intimation that such fish existed in Devon, except in some private water of Lord Clifford's, at Chudleigh. I was, therefore, much surprised, on my arrival at this place, to find Slapton Lea swarming with large pike, perch, roach, and eels. The problem to be solved is, whence came these pike, perch, and roach? As far as I can learn, they exist only in the place I have mentioned, which is more than 30 miles hence; and, to my own certain knowledge, there are none in this immediate neighbourhood. The two rivulets which flow into the Lea, afford trout in some abundance, of good flavour, but small, one of a pound's weight being accounted large. I have observed that the trout in the Dart, and in all the rivers in which I have fished in this county, are small.

Another rare occurrence respecting this piece of water exists. The water of the Lea empties itself into the bay, by oozing through the sand, which consists of large coarse-grained nodules of various sizes, from that of a pea to the bulk of a man's fist. When the tides in the bay are low, the Lea discharges its waters in great quantities through the sand into the bay; but should the water in the Lea be low, and a spring tide occur, the salt water in like manner flows through the sand, and rapidly advances the water in the Lea. There is one particular spot where this principally occurs, named the Gulf, and many instances are on record in which the sea and the Lea have been united; but, as in my present letter I design only to give you a general outline of the place, I shall reserve a particular account of these circumstances for a future



a, Torcross.

b, Watchhouse.
c, Road to Stokenham.

d, Marsh.
e, Bridge and Road to Stokeley House.

k k, High-water mark.

g, Cow Point.

f f, The lower Lea.
i i i, The shore sands.

h, Hartshorn Point.

l, Western cellars.
m, Boundary line between Stokenham parish above, or to the south, and Slapton parish below, or to the north.
n, Boundary stone.

o, Slapton cellars.
p, Limekilns.

q, Round-house.
r, Road to Slapton.

s, The higher Ley.

x, Gun or boundary stone.

t, Blackawton parish.
u, Intended road.

v, Abraham Wellend, Esq.
w, Gate to Street Hill.

letter. Slapton Sands, by which the Lea and sea are divided, afford but few specimens of shells, and those of the most common occurrence. Many species of the genus Trínga breed here. Start Bay supplies the neighbourhood with abundance and variety of excellent fish. Of these I purpose giving you as good an account as I can; but I must confess that I am not at present very conversant with the science of ichthyology. In botany I hope to be able to supply you with a list of *plantæ rariores;* but my residence here having been of short duration, I cannot speak with absolute certainty upon that subject. *F*ílices abound, and I see the leaves of the Sibthórp*ia* europæ̀a in some moist rocky spots in the village. In the meadows in the autumn I gathered Bárts*ia* viscòsa.

I will now close my present letter, with the assurance of my desire to assist your undertaking in every way that lies in my power; and if you think that my present letter is worthy of insertion in your most useful Magazine, I shall be proud to communicate to its pages any thing relative to the delightful science of natural history that may present itself to my notice.

I send you herewith a map of Slapton Lea (*fig.* 104.), of which you can make what use you please.

I am, Sir, &c.

Slapton, Devon, April 23. H. V. D.

Art. II. *Supposed Parasite Habits of the Night-jar* (*Caprimúlgus europæ̀us*), *and Nests of the Cuckoo.* By J. Rennie, Esq.

The statement of your correspondent, Mr. Masters, of the Canterbury Museum (Vol. III. p. 192.), with respect to the night-jar depositing an egg, like the cuckoo, in the nest of the hedge-sparrow, appeared to me so very anomalous and unaccountable, that, on looking into it a little closely, and turning the subject in my mind, I was led to a rather different conclusion; which he may, perhaps, be able to rectify if I have fallen into error. The parasite habit in question has been ascertained to belong exclusively to a singular American bird, the cow bunting (Passerìna pécoris *Vieillot*, Emberìza pécoris *Wilson*[*]), and to the genuine cuckoos, — the observations of the accurate Vaillant, on several species of Southern Africa, proving that it is not confined to our common cuckoo (Cùculus canòrus). Vaillant further ascertained that the cuckoo does not sit on the nest in which she lays her egg, but lays it on the ground, and carries it to the nest made choice off in her bill[*]; as our own cuckoo must do, beyond a doubt, when it deposits its egg in the nest of the wren, the chiff-chaff (Sylvia hippolaïs), or the redstart (S. *Phœnicurus*), as the narrow entrance of these nests precludes any other mode of introducing it. Mr. Masters, as above, asserts the same of the night-jar; but I have not the slightest doubt that the bird in question was not a night-jar but a cuckoo, for which it may readily be mistaken, even by naturalists of considerable experience, as a young cuckoo is so unlike the full-grown bird that it has led to many mistakes. Block[†], as well as Sanders[‡], and Sepp[§], who is usually accurate in the most minute particular, have even mistaken the egg, and figured the large oval white marbled with brown egg of the night-jar for that of the cuckoo, which is always small, rounded, and greenish, yellowish, bluish, or greyish white, and always blotched, not marbled, with olive or ash colour, being about the size of a house-sparrow's, and very like it in colour, while the night-jar's egg is larger than a blackbird's.[‖] The young of the night-jar does not differ from the full-grown bird; but the cuckoo does not attain its mature plumage till the third year; and, instead of the greyish lead blue of the old birds, is brown, with numerous spots and cross-streaks of a reddish rust colour, very similar to the markings of the night-jar. The two birds, when full-grown, are also precisely of the same size, namely, 10½ in. in length.[⫞] The similarity, then, I think, is tolerably complete.

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[*] Oiseaux d'Afrique, vol. v. See Didric, &c.

"As the young of the cuckoo," says Colonel Montague, "differs so materially in the first year's plumage from the adult, it may not be improper to give a description for the information of those who may wish to know the distinction.

"The irides are greyish; the whole upper part of the plumage is a mixture of dusky black and ferruginous in transverse bars, except the forehead, and a patch on the back of the head, which (in this specimen) is white; and the tips of the scapulars are pale: the feathers of the whole under parts are sullied white, with distant transverse bars of dusky black. In general each feather possesses two or three bars: the sides of the neck and breast tinged with rufous: the lateral feathers of the tail, and the inner webs of the quills, more or less barred with white; the coverts of the tail, which, as well as those on the rump, are unusually long, dashed with cinereous, and slightly tipped with white." *

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[*] Wilson's Amer. Ornithology, ii. 46.

[†] Besc. der Berlin, Gess. iv. tab. 18. fig. 1.

[‡] Naturf. xiv. s. 49.

[§] Sepp, Nederl. Vogel, ii. 117.

[‖] Latham, Gen. Hist. of Birds, iii. 261.

[⫞] Temminck, Manuel, p. 382—437.

The young cuckoo, on account of the reddish brown plumage just described, has by some distinguished naturalists been ranked as a separate species, under the name of the red cuckoo (Cùculus rùfus *Brisson*, C. hepáticus *Lath. Ind.*). There can be no doubt, however, but that, from recent investigations, this supposed red, or hepatic, cuckoo is not distinct from the common species. †

The variety of the colouring in the cuckoo has, likewise, more than once caused it to be mistaken for several other birds, such as different kinds of hawks, for the wood pigeon‡, and for a merlin (Fálco *Æ'*salon *Temminck*) §, so that Mr. Masters is by no means alone in the affair. Nay, I have just met with a passage in White's *Selborne* which furnishes a circumstance exactly parallel.

" A countryman told me," says White, " he had found a young fern owl in the nest of a small bird on the ground, and that it was fed by the little bird. I went to see this extraordinary phenomenon, and found that it was a young cuckoo, hatched in the nest of a titlark; it was become vastly too big for its nest, appearing

——— " ' in tenui re
Majores pennas nido extendisse; ' ||

and was very fierce and pugnacious, pursuing my finger as I teased it for many feet from the nest, and sparring and buffeting with its wings like a game-cock. The dupe of a dam appeared at a distance, hovering about with meat in its mouth, and expressing the greatest solicitude." ¶

I think, after these circumstances being justly weighed, that the night-jar ought to be exculpated from the charge of being a parasite, though it certainly does not take the trouble of constructing any sort of nest, but lays its two eggs (the cuckoo lays six) on the bare ground, among heath, furze, or long grass, and usually near a wood, sometimes at the foot of trees, or in the holes of their trunks.

J. Rennie.

Lee, Kent, May 22.

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* Supplement to Ornith. Dict., art. Cuckoo.

† See Mag. of Nat. Hist., vol. ii. p. 249, 250.

‡ M. Hérissaut in Mém. de l'Acad. des Sciences, 1752, p. 417.

§ Salerne, Hist. des Oiseaux, p. 40.

|| " To have stretched its wings beyond the little nest."

¶ Nat. Hist. of Selborne, i. 225., ed. London, 1825.

Since writing the above, I have met with two instances in which I think the night-jar (*Caprimúlgus europæ̀us*) has been taken for a cuckoo, as in the preceding ones the cuckoo was taken for a night-jar. In a manuscript of Derham's on instinct, communicated by Pennant to Daines Barrington, it is stated that "the Rev. Mr. Stafford was walking in Glossop Dale, in the Peak of Derbyshire, and saw a cuckoo rise from its nest, which was on the stump of a tree that had been some time felled, so as much to resemble the colour of the bird. In this nest were two young cuckoos, one of which he fastened to the ground by means of a peg and line, and very frequently, for many days, beheld the old cuckoo feed there her young ones."* From this Dr. Fleming hastily leaps to the conclusion, that, "in some cases, the cuckoo constructs its own nest;" and hence he gives it as a characteristic of the species: "Nest seldom constructed by the cuckoo itself, the eggs being generally dropped, separately, into the nests of the hedge sparrow, &c., in the temporary absence of their owner." † If Dr. Fleming, however, will take the trouble to peruse the following statements of Dr. Darwin and Dr. Jenner, we think he may be induced (as he seems fond of changes) to alter his opinion: —

"The following extract," says Darwin, "of a letter from the Rev. Mr. Wilmot of Morley, near Derby, strengthens the truth of the fact above mentioned, of the cuckoo sometimes making a nest, and hatching her own young.

"In the beginning of July, 1792, I was attending some labourers on my farm, when one of them said to me, 'There is a bird's nest upon one of coal-slack hills: the bird is now sitting, and is exactly like a cuckoo. They say that cuckoos never hatch their own eggs, otherwise I should have sworn it was one.' He took me to the spot: it was in an open fallow ground. The bird was upon the nest: I stood and observed her some time, and was perfectly satisfied it was a cuckoo. I then put my hand towards her, and she almost let me touch her before she rose from the nest; which she appeared to quit with great uneasiness, skimming over the ground in the manner that a hen partridge does when disturbed from a new-hatched brood, and went only to a thicket 40 or 50 yards from the nest, and continued there as long as I stayed to observe her, which was not many minutes. In the nest, which was barely a hole scratched out of the coal-slack, in the manner of a plover's nest, I observed three eggs, but did not touch them. As I had labourers constantly at work in that field, I went thither every day, and always looked if the bird was there; but did not disturb it for seven or eight days, when I was tempted to drive it from the nest, and found *two* young ones, that appeared to have been hatched for some days, but there was no appearance of the third egg. I then mentioned this extraordinary circumstance (for such I thought it) to Mr. and Mrs. Holyoak of Bidford Grange, Warwickshire, and to Miss M. Willes, who were on a visit at my house, and who all went to see it. Very lately I reminded Mr. Holyoak of it, who told me he had a perfect recollection of the whole; and that, considering it a curiosity, he walked to look at it several times, was perfectly satisfied as to its being a cuckoo, and thought her more attentive to her young than any other bird he ever observed, having always found her brooding her young. In about a week after I first saw the young ones one of them was missing, and I rather suspected my ploughboys had taken it, though it might possibly have been taken by a hawk, some time when the old one was seeking food. I never found her off her nest but once, and that was the last time I saw the remaining young one, when it was almost full feathered. I then went from home for two or three days, and when I returned the young one was gone, which, I take for granted, had flown. Though, during this time, I frequently saw cuckoos in the thicket I mention, I never saw the cock bird paired with this hen." *

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* Philosophical Transactions for 1772, p. 299.

† British Zool., p. 90.

Now, I cannot but think that the following remarks of Dr. Jenner leave no doubt that the nest observed by Mr. Wilmot, as well as that seen by Mr. Stafford, belonged not to the cuckoo, but the night-jar: — "With due deference," says Jenner, "to Dr. Darwin, I am inclined to think that the opinion he set forth respecting the training of cuckoos was taken up hastily; and that the birds which his friend saw feeding their nestlings were not cuckoos but goatsuckers, whose mode of nestling corresponds with the relation given, and whose appearance might be mistaken for them by one not perfectly conversant with the plumage and the general appearance of cuckoos when on the wing." †

The assertion of Aristotle, that the cuckoo sometimes builds among broken rocks and on high mountains ‡, and a similar remark quoted from Niphus by Gesner §, are no more to be trusted than his story of the redbreast being annually changed ||

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* Darwin's Zoonomia, i. 246., 3d edit. 8vo.

† Jenner in Philosophical Transactions for 1824, p. 42.

‡ Aristotle, Hist. Anim. vi. 1.

§ Gesner, Ade vibus, iii.

|| Pliny, Ælian, Salerne, &c.

into a redstart; or of the cuckoo itself being nothing but a metamorphosed sparrow-hawk, while, immediately after this miraculous change, it is so weak, that the kite is so obliging as to carry it on its back!!! — So grossly are the commonest facts misrepresented, when not observed with scrupulous accuracy.

Art. III. *On a remarkable Formation of the Bill observed in several Species of Birds.* By John Blackwall, Esq.

Sir,

Instances of extraordinary deviation from typical forms in the structure of animated beings are highly interesting to the physiologist, whether his attention be directed to the influence which organic modifications exercise upon the animal economy, or to the more abstruse investigation of the predisposing causes of these curious phenomena. Such being the case, a concise account of a few examples of this nature, which have recently come to my knowledge, will, it is presumed, require no apology.

A jackdaw, killed at Bowers, in the parish of Standon, Staffordshire, was presented, in January last, to the Society for the Promotion of Natural History established in Manchester, and is now deposited in their Museum in King Street. This bird, in the structure of its bill, presents a form closely resembling that which so strikingly characterises the species constituting the genus Lóxia, the mandibles crossing each other at some distance from their points, the upper one curving downward on the right side of the lower one, which takes an upward direction to the left. The preternatural elongation of the mandibles, in conjunction with a considerable degree of curvature, gives to this individual, which, on dissection, proved to be a male, a peculiar physiognomical expression, and must have contributed greatly to modify its manner of feeding; the contents of the stomach, however, were so changed by maceration, that it was not possible to determine by inspection of what they consisted. I may remark, that this bird was in excellent condition, notwithstanding the inclemency of the season; a convincing proof that it had acquired much expertness in the management of its singularly formed bill.

A rook, also preserved in the Manchester Museum, has its mandibles crossed near their extremities, but so slightly as not to have interfered materially with the mode of procuring food usually employed by this species, as is clearly evinced by the denuded state of the nostrils and the anterior part of the head, both of which are entirely destitute of feathers. Another specimen, in the possession of Mr. R. Wood, a zealous collector of objects in natural history, residing in Manchester, has the mandibles greatly elongated and much curved, as in the case of the jackdaw detailed above. Now it is evident that the bird, possessing a bill thus formed, could not thrust it into the ground in search of worms and the larvæ of insects, as the rook is known to do habitually; and, accordingly, the plumage at the base of the bill of this individual, and the bristly feathers which cover its nostrils, are very conspicuous, not having sustained the slightest injury. The opinion entertained by many persons, that the naked condition of the nostrils and anterior part of the head is an original peculiarity in the rook, is thus satisfactorily proved to be incorrect; indeed, the fact that young rooks exhibit no deficiency in these particulars is sufficiently conclusive on this point: but the possibility of an entire species being endowed with an instinct destructive of a useful portion of its organisation, which, consequently, appears to be bestowed upon it in vain, was probably never contemplated by these observers; it is not surprising, therefore, that the inference deduced from a partial view of the subject should be erroneous.

The last instance of this anomalous structure of the bill which has fallen under my observation, occurred in a specimen of the red-headed woodpecker (*Pìcus* erythrocéphalus), contained in a collection of birds' skins lately brought from the United States of North America. In this individual the mandibles, though pretty much elongated, are but slightly curved, the upper one, as in the preceding cases (Mr. Wood's rook alone excepted, in which the direction is reversed), crossing the lower one on the right side. A bill so constructed must have proved exceedingly inconvenient to a bird of this species.

I might now proceed to speculate upon the circumstances which have contributed to produce this phenomenon; but, as my acquaintance with the history of the birds in which I have seen it exhibited is so imperfect, that any thing I could advance concerning them would be little more than conjectural, I possess no certain data on which to found an exact investigation, and, having no hypothesis to support, shall decline entering into the enquiry.

John Blackwall.

Crumpsall Hall, May 4.

ART. IV. *Remarkable Visitation of the* Phalæ̀na *typicöides.* By E. S.

Sir,

IN Vol. III. p. 247. I observe an article from J. H. Davis, Esq., R. M., on the periodical appearance of certain insects, to the general truth of which every observer of natural history will bear testimony. As a sequel to his communication, I beg leave to relate a somewhat singular instance which occurred to me in the year 1826, respecting the *P*halæ̀na typicöides, called by Donovan[*] "the scarce Gothic moth;" being on that account, as he adds, much esteemed among collectors in Britain. Godart[†] also, in his valuable work on French Lepidóptera, mentions it as by no means common in the environs of Paris; and, from the slight allusion and few particulars recorded by Samouelle, it may be inferred that he too had seldom met with it. Haworth[‡], indeed, pronounces it to be "ripis frequens" (common on banks); but my own experience accords with that of the above entomologists, who have considered it to be scarce, having, during a rather close attention to the natural history of this parish[§], only seen it once in the course of twenty years, on the following occasion: —

About 7 o'clock on the 25th of August, 1826, the weather having throughout the day been sultry and gloomy, and the evening closing in with a damp oppressive air, barom. 29·15, when sitting in a room on the ground-floor, with folding doors opening on a lawn, I was surprised at the sight of a moth of this species, fluttering round the spherical gauze covering on the summit of a French lamp. In a few minutes another made its appearance; and these were in a short time followed by a small number of stragglers. About 8 o'clock, heavy drops of rain began to fall, and finally a tremendous shower set in, which continued with little intermission till near 10 o'clock, accompanied with vivid lightning and loud claps of thunder. When the storm commenced I closed the doors: but my attention was soon drawn to a pattering noise at the windows, which were actually beset with crowds of moths beating against the panes, or creeping up and down in a hurried and tumultuous manner. I should remark, that they were partially sheltered from the immediate effect of rain by a covering of trellis-work thickly interwoven with honeysuckles, extending round the front of the room in which I sat. On opening the glass doors, a rush of these fluttering

[*] Donov., vol. xv. p. 2. pl. 505.
[†] Godart, Lepid., vol. vi. p. 269. pl. 90. fig. 1.
[‡] Haworth. Lepid., vol. ii. p. 195.
[§] In the county of Chester.

intruders took place; and my astonishment was not a little increased on finding, as they collected in accumulated bodies round the lamp, with not more than two or three exceptions, the mass consisted of these hitherto unobserved *Ph*alæ̀næ typicöìdes. Soon after ten o'clock, when the shower had subsided, the assemblage diminished, and at length my visiters altogether retired; and from that hour to this I have never again observed a single specimen.

Granting that the peculiar circumstances of the rain or electrical state of the air may have driven them to the light of the window and lamp, I cannot but think, if they had been tolerably plentiful either in previous or subsequent years, I must have detected a few stray individuals; and I can only account for the inundation on this evening by extraordinary broods having been bred in the neighbourhood, or that this vast flight was performing an act of itinerancy, during which it was overtaken by the shower, and compelled to seek protection under the closing shelter of the trellis-work. To this latter opinion I feel the more inclined to accede, from the circumstance that, with the exception of the small nettle (*U*rtìca ùrens), the other plants on which the larvæ are said to feed, viz. white mullein (*V*erbáscum Lychnìtis), motherwort (Leonùrus Cardìaca), hound's-tongue (*C*ynoglóssum officinàle), bay-leaved willow (Sàlix pentándra), are some of them rather scarce, and none of them certainly plentiful in the vicinity; and the authorities for the occasional migration of insects, of the various orders Coleóptera, Lepidóptera, Hemíptera, &c., are too strong and too numerous to admit of doubt as to the fact. Thus, Mr. Marsham mentions the case of a lady's dress being covered with *C*icàdæ bifasciàtæ*, a small hemipterous insect by no means common; when, on the following day, the same steps being taken to procure some, not a single one could be found. The same circumstance was noticed by a friend of his a few years afterwards; and it was their opinion that the insects in question were migrating. A similar occurrence relating to a family of the same order, viz. *C*icàda spumària, or froth froghopper, is alluded to by Mr. Kirby on the authority of Professor Walch, whose case in some degree resembles mine. He says, that one night about eleven o'clock, sitting in his study, his attention was attracted by what seemed the pelting of hail against his window; which surprising him by its long continuance, he opened the window, and found the noise to proceed from a flight of these little froghoppers, which entered the room in such numbers as to cover the table. On a calm sunny day, another naturalist observed a prodigious flight of the common cabbage butterflies (*Papílio brássicæ*), passing from N. E. to S. W. for two hours. Another swarm of these insects was met with midway in the British Channel; and I have myself observed some wanderers in the Atlantic, at least seventy or eighty miles from land, flitting away apparently without fatigue, and not even settling to rest upon the rigging. Mr. Lindley, a writer in the *Royal Military Chronicle*, tells us that in Brazil, in the beginning of March, 1803, for many days successively, there was an immense flight of white and yellow butterflies, probably of the same tribe as the cabbage butterflies. They were observed, like my friends in the Atlantic, never to settle; though, as their course was in a direct line for the ocean, and they were last seen at no great distance from it, they probably ultimately became victims to the innate feeling which prompted them to quit the land.

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* See Donov. pl. 387.

With these instances on record, we may conclude that, if such things take place at noon-day amongst the diurnal lepidopterous insects, under the shades of night the crepuscularian tribes of Lepidóptera, impelled by a similar unaccountable instinct, may wing their way over tracts of country, unsuspected and unobserved, till some accident like the before-mentioned may arrest their career, and present them to the wondering eyes of naturalists, who, but from some such theory as migration, can account for mysterious appearances of these minor tenants of the air, whose visitations are so few and far between.

June 28. 1830. E. S.

Art. V. *On the Specific Identity of the Primrose, Oxlip, Cowslip, and Polyanthus.* By the Rev. John Stevens Henslow, Professor of Botany in the University of Cambridge.

Sir,

Our knowledge of vegetable physiology has not been hitherto sufficiently advanced, to furnish us with any precise rule for distinguishing the exact limits between which any given species of plant may vary. Hence the most accurate observers often differ in their opinions, whether two or more individuals should be considered as mere varieties of the same, or be raised to the rank of separate species. Indeed, the more accurate our powers of discrimination become, the more inclined we seem to be to multiply species. There are, however, certain stubborn, well-authenticated facts, which tend to lower the authority of that discriminating tact which the accomplished naturalist possesses in so great perfection, and to persuade us that it is not unlikely that this will, after all, prove to be of little or no value towards the final solution of the question. It should now seem that nothing but the multiplied results of direct and accurate experiment can be allowed to form the basis of our speculations in this, any more than in every other department, of science. One well authenticated fact will easily shake the most specious conjectures; and, if we do not listen to Nature when she is taking her own method of opening to us her mysteries, we may be assured that we have that spirit within which would rather be led by its own fancies than bow even to the still higher authority by which Nature is herself directed. Cultivation, we know, produces numerous and very strange varieties of the same species; and, what seems highly remarkable, these varieties, when once established, frequently continue permanent through a succession of crops raised from them by seed, except now and then, where an accidental return to what is considered to be the original stock takes place. Thus, to pass over the thousand well known cases among our culinary plants, we find many seedlings of the variegated sycamore striped like the parent plant, though some of the same crop have lost this character. But if it is no sure test, that a given form should cause an individual to rank as a distinct species, merely because we find that form can be propagated unaltered by seed; still less is it any clue to the accurate discrimination of species, that the same character should have been retained by the same individual for many years. On the other hand, however, it is clear that one single instance of change from one form to another, whether produced by seed or culture of the individual, if well established, is quite sufficient to reduce any two of the most permanent forms to the subordinate station of mutual varieties.

What has been hitherto recorded of the production of hybrids, has rather thrown confusion than order in the way of this enquiry. The parents of many of these supposed hybrids may, after all, turn out to be no more than mere varieties of the same, though, in some instances, they have, in all probability, belonged to different species. What the law of nature in this respect really is, we can hardly be said to have ascertained. If we search for analogy in the neighbouring study of entomology, we shall find that it is only very lately that entomologists have ascertained that the nineteen varieties of Coccinélla variábilis, mentioned in Stephens's *Catalogue* as found in Great Britain, form only a single species. Mr. Stephens has recorded a similar reduction in the nineteen British varieties of Coccinélla mutábilis, each of which was formerly considered as a distinct species. Further experience may, therefore, in due time, furnish the botanist also with some satisfactory test for the reduction of his species.

My own attention has been more particularly excited on this subject, by finding myself unexpectedly obliged to submit to the old opinion of Linnæus, in contradiction to that entertained by most modern botanists, that the primrose, oxlip, cowslip, and polyanthus are only varieties of one species. Upon what Linnæus founded his opinion, I know not; but, in vol. iv. p. 19. of the *Horticultural Transactions*, in a paper by the Hon. and Rev. W. Herbert, on the production of hybrids, there is recorded an experiment (which I see you have alluded to in your *Encyclopædia of Gardening*) so directly to the purpose, that no one who trusts to its accuracy can possibly resist its evidence. Mr. Herbert remarks: — "I raised, from the natural seed of one umbel of a highly manured red cowslip, a primrose, a cowslip, oxlips of the usual and other colours, a black polyanthus, a hose-in-hose cowslip, and a natural primrose bearing its flower on a polyanthus stalk. From the seed of that very hose-in-hose cowslip I have since raised a hose-in-hose primrose. I therefore consider all these to be only local varieties, depending upon soil and situation." I confess that I had myself given very little credit to this experiment of Mr. Herbert's, until it was recalled to my mind by a circumstance which I noticed in April, 1826, a few miles from Cambridge, at a place called Westhoe. I there found in great plenty a peculiar variety of Prímula, which I scarcely knew whether to call the oxlip or the cowslip. The leaves were larger and more downy than those usually found upon either of these plants; the flowers were in umbels, some drooping and others erect, and varying, in size and shape, from the ordinary character of the cowslip to that of the oxlip; the colour was as light a yellow as the usual tint of the primrose. Although this variety was every where abundant, both in the copses and open fields, neither myself nor a friend who was with me could find a single primrose in the neighbourhood, and comparatively few decided cowslips; which, however, were here and there scattered among this variety. At the very time that I first observed these plants, I was also much surprised at finding that a specimen of the cowslip, which had been transplanted into my garden when in flower the previous year, had completely changed its character this year; the limb of the corolla having become flatter and broader, the colour paler, and the whole appearance more like that of the oxlip. In the spring of the following year (1827), this plant threw up a few single-flowered scapes in addition to its umbels. The single flowers were somewhat smaller, and more deeply coloured, than those of the common primrose. After flowering the root decayed, and the plant separated into several smaller parts, which were transplanted, and have since flowered; each having both single and compound scapes. I may here observe, that plants with both single and compound scapes are very common in this neighbourhood, similar to that figured in the *Flòra Londinénsis*, which Dr. Hooker there styles the oxlip, and Sir Jas. Smith, in the *English Flòra*, considers to be a variety of the primrose.

I now collected the seed of some cowslips which were growing in a shady part of my garden, and sowed them in a similar situation. From this seed I have raised several plants, varying very considerably in their character. One is a perfect primrose; and all the rest approach, more or less, to the light-coloured variety of Westhoe. Not one has the decided character of the common cowslip.

I am not aware of any defect in the experiment from which this result has been obtained; but if the utmost accuracy be required by any one who may be still sceptical, I should recommend him to repeat the experiment, with the additional precaution of protecting the cowslips to be seeded from the approach of insects, that every possibility of the seedlings being hybrids may be avoided. The seed should be sown in a moist situation, and selected also from plants thus circumstanced; since it seems probable that such a combination of circumstances is better adapted to secure the developement of the characters of the primrose. The process which Mr. Herbert adopted, of highly manuring the cowslip from which his seed was selected, may possibly be still more likely to insure success.

If any of your correspondents can be prevailed upon to repeat these experiments in different parts of England, and favour you with the results, whether successful or not, they may do good service towards the final elucidation of this subject; and should Mr. Herbert ever present the public with a more detailed account of his own observations, he would confer an invaluable benefit upon those who wish to prosecute the enquiry. The best form for registering a series of such experiments, for the convenience of reference and comparison, would be, to class them numerically under different genera, and throw the remarks and occasional observations under separate heads, arranged as a table, being careful not to omit the mention of all the failures or unsatisfactory results.

I am, Sir, &c.

J. S. Henslow.

Art. VI. *Remarks on the Relation subsisting between Geological Strata and the Plants most frequently found growing on their superincumbent Soils.* By William Thomson, Esq. A.M.

In perusing lately a short but masterly delineation of a district in Aberdeenshire, by Dr. Alexander Murray, published in the *Edinburgh New Philosophical Journal,* I was struck with the author's remarks on one part of his subject particularly, as they bore on some slight observations of my own on the same subject. The words are these: —

"After these remarks on the face of the country and the rocks, I wish to observe, that not unfrequently I have endeavoured to discover whether, in the comparatively limited tract to which the present observations relate, any decided connection could be traced between the native plants and the soils wherein they are found. Few enquiries are more inviting; and the opinion that a connection of this kind exists has, at least, a plausible appearance: but, after some attentive consideration, I venture to suggest, that there is not in science a more hopeless labour than the attempt to discover an unvarying and necessary relation between most plants and the soils wherein they grow. I feel convinced that, except in point of moistness, compactness, and depth, soils have, in general, no cognisable relation to their vegetable products. This opinion is, on my part, the result of observation; and it appears, when well examined, no less to accord with reason than experience. Let us survey Britain, for example, and we find the soils in all places composed mainly of silica, alumina, magnesia, and lime, with accidental animal and vegetable impregnations. Now, is it reasonable to expect, that we could, in our present state of knowledge, trace a general relation between those few elements of soil and the highly diversified vegetable products which are indigenous in our island? Or that we should ever extend our knowledge so far, so very far beyond our present limits, as to enable us to solve the difficult problem in question?"

The decided opinion of a naturalist who has shown such accuracy of research throughout the paper from which I have just quoted, inclines me to regard this opinion as deserving of much notice, as well on its own account, as from the comparatively little attention which has hitherto been given by botanists to the geography of plants.

Every ardent lover of nature must indulge a desire to connect with each other the great kingdoms of nature, so as at once to link our studies and to condense our views of divine order. I trust, therefore, that future observation will show, that, whatever be the simplicity of the elements composing the soils of our globe, yet the grand framework of rocks, which so appropriately mark out the limits and define the aspects of countries, also largely influences, if it does not determine invariably, the vegetable productions assigned to them. Nor is it unreasonable to hope that the two growing sciences of geology and botany may be thus connected: for what is there more unsuited to each other in the rock and its vegetable tenant, than in the phenomena of Iceland crystal and the arch of an aurora; in the magnetic power of an iron ore, and of an electrical machine? The progress of science tends not to confound by multiplying facts, but to reduce the number of general laws, by showing how the extremes of nature illustrate the same simple principle.

The truth or falsehood of any position may be proved in two ways: by reason or experience. Let us examine the position of the author in both of these lights.

1. From the common principle of reason, to which Dr. Murray appeals, it must follow, that since plants have no necessary connection with the soil in which they grow, we might expect every soil to produce, with fair advantages of climate and moisture, any given vegetable spontaneously and abundantly: a conclusion which is manifestly at variance with fact. It would follow also, that at equal elevations, and in equal climates, the same vegetable productions might be expected: this also is contrary to experience. Districts as near as possible to each other are found to differ most materially in their spontaneous productions; and invariably, when undisturbed, this difference is in proportion to the variation of strata. On the north and south sides of Manchester the soil is clayey and sandy; yet the soils are not more apposite than the prevailing grasses of the meadows. An experienced eye can discern the preeminent spikes of crested cynosure in every well-kept meadow between Manchester and Stockport; scarce one root of which has found its way (though the winds prevail towards that quarter) into the pastures on the Cheetham side, devoted to the soft *Alopecùrus*, and the rich tufted *Phlèum*.

Little would it reward the industry of the collector to trace every neighbouring denudation of the new red sandstone, with the meadows and copses covering it, in search of the saxifrages; the parnassia; the bee, the male, or the spider orchis; the fragrant marjoram; or the rich tints of the blue and red snapdragons. He may continue his search from Lancaster to Liverpool, and across Cheshire, Lancashire, and Derbyshire, to within a few miles of Matlock, and still without success. Let him, then, but set foot on the mountain limestone, and he will find them all in rich profusion.

2. Nor is it so unreasonable to expect that the elements of merely silica, alumina, magnesia, and lime, with vegetable and animal impregnations, should afford a test of the productions *peculiar* to them. From six elements how numerous may be the combinations, when it is recollected that any one of them will form a soil sufficient to support many plants![*]

For if these elements are few and simple, equally simple is the structure of vegetable frames. According to the experiments of Geoffroy and Tournefort, all vegetables yielded only a very slight earthy base and a little volatile oil, except water. It would seem natural, therefore, to conclude that each simple element has its appropriate plants, which feed on it, besides the numerous others which partake of its nutritious particles in a state of combination.

3. It is not unreasonable to suppose that the substratum of each district has extensive influence over the soil lying on it, by the débris it discharges through rivers, valleys, and hills, under the influence of drainage and frost.[†]

4. Since it is not contrary to reason to conclude that the soil is dependent on the stratification; so is it reasonable to conclude, that the climate is greatly modified by the same cause. The peaks of mountains, it is well known, attract rain; and level strata, such as our new red sandstone, retain moisture long on their surfaces in the various forms of pools, rivers, and marshes. The porousness, clefty form, or closeness of the mass of the rocks themselves must, we should therefore presume, greatly modify the climate by the drainage they obstruct or promote, and the heat they produce from reflection. How different the heat of a basalt or smooth granite rock from that of rough limestone, or red sandstone, or ragged grit! and how various the irregularities of course in streams traversing a bold primitive range, or a craggy transition, or a level pavement of secondary rock! Now plants are the most sensitive things alive; they are the most perfect barometers, and register every change, even the slightest, in the temperature and moisture in the atmosphere. They are shutting up their lovely petals when the sun reaches certain elevations in the heavens; and they are drooping their heads, and closing even their large fleshy leaves, at the approach of a change, even when the ther-

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[*] As there are transition rocks, so there are transition plants found in the primitive and transition districts equally, or in the transition and secondary equally, or in the secondary and alluvial equally. It is contended, however, that the same plants do not thrive equally in districts widely dissimilar in geological structure.

[†] Secondary sand brought down by rivers hinders, primary sand promotes, vegetation.

mometer is languid, and the mercury in the weather-glass is stationary. Some choose the south, some the north, and others the west side of a hedge; one chooses the angle of a rock which looks up towards the sky, another lurks beneath the hedge, nor will exchange its own dull nook for the sunny glories of its neighbour. All, in short, of this vast tribe of living things, the only living things that are unable to choose their place and change it spontaneously, press on our attention the singular peculiarity of their geological positions.

Were we to appeal to experience for another confirmation of our theory, we should with confidence refer to the fact, that primitive ranges produce the greatest variety and richest specimens of vegetables; a phenomenon derived from the obvious aptitude of such rocks to furnish the best and quickest soil for vegetable growth. And we should contrast with these ranges the poverty and slow production of secondary and diluvial districts: we should simply contrast the shores of Orme's Head and Devonshire with those of Lancashire, and leave each enquirer to his own conclusions, satisfied that they would be favourable to the relation we endeavour to establish.

I proceed next to state several coincidences of similar strata with similar vegetables, which have appeared to me not accidental, but indicative of a constant relation, which time and opportunity will corroborate.

The author, with perfect candour, affords us an instance in his paper: — "It is remarkable," says he, "that the hill of Strathdon (which differs in materials from the neighbouring hills) has a peculiarity in its vegetation. The contiguous hills are invariably covered with heaths; but the hill just mentioned derives its name from a green covering of grass: it produces, as it is also worthy of notice, Arenària vérna, Cochleària officinàlis and Státice Armèria; of which the two last are rare in that quarter; and as to Arenària vérna, I never met with it in that part of Scotland, unless in the spot mentioned, and again at Leslie, growing on the very serpentine rock with which it is associated at Strathdon."

An instance is afforded in the promontory of Orme's Head. Here the same range of mountain limestone stretches towards Anglesea, and has for its link the rock of Priestholm or Puffin Island. Not more strikingly do these round hills contrast with the bold crags of Penmonmaur and the Caernarvon mountains, than do the vegetable coverings of these two contiguous districts. Priestholm, I understand from my correspondent, Mr. Wilson of Warrington, possesses all the peculiar rock plants of Orme's Head except one, *Méspilus* Cotoneáster, which has been found in no other locality in the British Isles. But samphire, cabbage, the rock roses, bloody crane's-bill, &c., *Plantàgo Corónopus*, and *P.* marítima, *Pýrus* Theophrásti, fennel, &c., are common equally to Orme's Head, Priestholm, and a part of Anglesea, which lies exactly opposite these rocks, and forms the continuation of the range of mountain limestone. When we come to examine the line of greenstone which forms the rocks of Caernarvonshire, we find not one trace of these luxuriant and beautiful vegetables.

This contrast is peculiarly striking at Beaumaris. A short ride along the north shore of Anglesea, from the town, brings you to the limestone range, with abundant traces of its plants; but on the south side of the town, the picturesque woods of Baron Hill skirting the Menai, and forming shelter of every kind for vegetables, there is not enough to reward even the most enthusiastic botanist. The causes may be in the stratum, which changes, near Beaumaris, from limestone to sienite and trap. The walk from Orme's Head, along shore, towards Abergele, affords a similar contrast. The mountain limestone plants prevail more or less, according to situation, exposure, and depth of soil, till you leave the range near Llandrillo; and then there appears a new and scanty range of vegetables, the products of a sandstone range which crosses from * Llansantfreyd, and introduces to the sea-shore the same plants which scantily adorn the Conway's bank about a mile above the bridge. These are *Glaúx* marítima, Silène marítima, and *Chelidònium Glaúcium* (the fetid celandine, or yellow horned poppy), a singular but disagreeable plant, and forming a strong contrast to the delicately tinted and fragrant *Thýmus*, marjoram, and milkworts you leave behind at the descent of Pen bâch. *Convólvulus* Soldanélla (sea bindweed) is one of the productions claimed by the greywacke formation of the Penmonmawr mountains, and denied to the limestone of Orme's Head. It is true that a few specimens may be encountered near Llandudno, but they are seldom seen in a flowering state; and I have never found one seed-vessel of that species on the shore opposite the town of Conway, although familiar to me from frequent search. The plant, however, flowers and produces seed in great abundance, on the level tract of shore subtending the cliffs of Penmonbach. It is unnecessary to repeat, that the rocks on either shore are quite different.

During the month of July, 1828, I had an opportunity of examining another mountain limestone district, St. Vincent's Rock, and Clifton Downs, near Bristol. In company with a devoted and highly accomplished naturalist, Mr. Rootsey of Bristol, I traversed a considerable portion of this district, and was agreeably surprised to meet so many of my old acquaintance of Orme's Head. The spiked speedwell and dropwort meadow-sweet waved on the downs as on the mountain pastures of Bodscallon; the broom rape and bloody crane's-bill sought here also the ledges of the cliff; from the crevices depended the *Á*ira Theophrásti, the yew, the ash, and the hawthorn; and the brushwood below was wreathed with the same pretty red convolvulus (*C.* arvénsis) which made the corn fields of Llandudno so "unprofitably gay." In short, the whole aspect of the place was so much the same, as to appear a portion of Caernarvonshire suddenly detached from its moorings, and transported 120 miles across the country; and the catalogue which I had drawn up from a botanical investigation of that, two years before, might have equally served as a Flora for St. Vincent's Rock. One prevailing exception is the samphire of Orme's Head, which is not a tenant of inland rocks, nor grows on any but the stormiest side of those on which it is found, exposed to the jarring winds and dashing spray. While, on the other hand, the Convallària majàlis and C. *P*olygónatum, and the luxuriant Gàlium *M*ollùgo, are more suited to the rich woody and sheltered soil of Lee Wood, and the soft inland breezes of Somersetshire, than the biting air and exposed surface of Caernarvonshire, where they do not spring.

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* Village of St. Friga, near Conway Bridge.

The basaltic ranges claim certain species, which, if not peculiar to them, are at least most luxuriant when they are grown upon whinstone soil. The native Gerània I have always found thriving best in such districts. Gerànium sanguíneum (blood-red crane's-bill), the most elegant of the genus, is richer in its tints, and stronger in its stem, near Edinburgh, and on the Carrick Shore of Ayrshire, than anywhere else throughout the whole range of my botanical excursions. On mountain-lime it is slender and straggling; on the basaltic ledges of Salisbury Crags, and beneath the "scaurs" of the Ayrshire whin, it exhibits the same dense bed of flower, with a thickness of stem, a compactness of leaf, and a hairiness of clothing so different, as almost to mark it out as specifically different from the *G.* sanguíneum of North Wales and its lakes. The Geranium sanguíneum of Carrick extends nearly a mile along the shore, in one continued tract of beauty, exhibiting a luxuriance superior to that of any other flower of distinguished loveliness which our island produces.

Geranium Robert*iànum* (herb Robert), so common every where, is more luxuriant in the same districts than any other.

Near the river Doon in Ayrshire, especially, its size was such as to incline me to examine it as a new species. Throughout Ayrshire this is one of the most fertile plants.

Geranium praténse (crowfoot crane's-bill) is, I am persuaded, to be found luxuriant only in basaltic districts. Every stream in Ayrshire, and to the east of Glasgow, is rendered eminently beautiful by the rich azure of its transparent petals, and the singular verdure of its long peltate leaf. The Clyde, the Calder, the Tannock, and every streamlet near Bothwell and Campsie Fells, possesses this flower. The bed of these rivers is basaltic.

In Ayrshire, the Ayr *, the Marnock, the Doon, the Irvine, and the Garnock have tufts of this plant on their banks, from the source to the sea. Long before botany became a study, these flowers gave an interest to that country which is still remembered with something of the quiet delight which an early love of nature produces and perpetuates; and even now, after the contemplation of mere beauty in flowers has given place to the pursuit of their scientific arrangement and philosophical properties, there is a childish delight in the rencontre of such mementos of early days, when time and thought and pleasure were young and pure. I have met them, thus, in southern counties, and occasionally near the Irwell; but how altered! "Quantum mutati ab illis!" † The hue is less brilliant, the herbage weaker, the bed a few thin and scattered patches. What can be the cause? Is it that later impressions are warped by prejudice, from want of novelty or of the requisite associations? Or does the preeminence of Ayrshire crane's-bill depend on the position of the streams, where it grows over basaltic rocks whose débris is more suited to vegetation of this kind than the washings of the new red sandstone of Lancashire? The latter conclusion I am willing to adopt, because it is the most reasonable; and, if for no other reason, because it favours my theory.

Geranium lùcidum belongs to lime, and seems not appropriate to basalt. Derbyshire abounds with this plant. I met a most luxuriant crop of it near Warwick. It was there growing on a base of lime; which was at considerable depth below the surface.

Eròdium marìnum I have seen only on Orme's Head, and at Mount Edgecumbe, near Plymouth, where I found it on the Devonshire marble, a rock very closely allied to the (Orme's Head) mountain limestone.

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[*] This stream occasionally crosses schist and plastic clay. In such places this geranium is not found.

[†] "How different from those!"

Eròdium *cicutàrium*, or moschàtum, belongs, I am inclined to believe, to the new red sandstone. The sand-hills of Bootle and Southport are covered with it, and considerable quantities appear on the banks of the Irwell at Barton.

The slate and transition limestone districts claim *Convólvulus* Soldanélla. The only localities I ever found of this plant are, the mouths of the river Conway, and of the Ex in Devonshire.

The heaths are found most luxuriant where granite or other primitive rocks are found. * These plants, as their names imply, are found always on bog soil; and, as the component particles of that earth may be taken as similar every where, yet it cannot be denied that the heaths of different contiguous hills are extremely different both in kind and degree. Red heather (*È*rìca cinèrea) is the only species found for miles together on the greywacke of the Isle of Man; *E. T*étralix, the only species for several hundred yards on Blackstone Edge; *E.* vulgàris is the only species for miles on the granite of Goatfell, in the Isle of Arran. Each of these species may be found in sufficient quantity wherever bog soil is found; but they may reasonably be claimed by those districts only, where, with equal climates, they are produced in greatest luxuriance: and few observers of the common features of a landscape can have failed to notice the great diversity of character in these universal natives of our moors, in the different geological arrangements of the country. Few can have omitted to notice the total want of them on bog whose substratum is chalk or mountain lime; and many have been delighted with their abundance and surpassing beauty in the primitive ranges of Wales and Scotland. The ling of Pont Aber Glas Llyn, near Reddgelert, yields to none in the richness of its flowers; and that of the granite range of Avan, in the Frith of Clyde, is often 3½ ft. in height, arborescent, and erect, like the finest specimens of Cape heaths cultivated in our green-houses. The poor natives of that island make an economical substitute for hemp from its twigs; and the roots, occasionally thrown out of the soil by the fury of a mountain-torrent, are 2 in. in thickness, and capable of a high polish, being nearly as hard as ebony. The Cape of Good Hope itself, which has supplied our exotic collections with nearly 300 species of this genus, is one of the finest granite ranges in the world.

Several species of *T*rifòlium are found in a singular manner united with the superstratum of mountain lime. It has been stated in the Philosophical and Literary Society of Manchester, by one of its most distinguished members (Mr. Moore), that wherever the brushwood of the lime district in Derbyshire is burnt down, the common *Trifòlium* praténse (Dutch clover) springs up; and on the pastures round Stonehouse, at Plymouth, I was informed by Lord Mount-Edgecumbe's steward, a similar species is produced by throwing over the land the crumbled soil of the harbour rock, which is commonly called Devonshire marble, a species of mountain or primitive lime.

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* Were it possible to conceive the universality of a vegetable soil, what would be the effect? I presume, a decrease of vegetation in general, and a total extinction of those plants best fitted to support animal life; the whòle of which, nearly, are the productions of rock soil.

Foxglove is common every where but on chalk; and, however usual the occurrence of this beautiful but noxious flower is throughout England, the Isle of Wight scarcely boasts a single specimen.

The chalk districts afford the most striking illustrations. Wherever you come to chalk, even at a depth below the soil, there you find in abundance saintfoin, conglomerate bellflower, nodding thistle, mountain galium, and dropwort meadowsweet, with a scarcity, almost a want, of the grasses, except those allied to the agrostis or bent, a dry, hard, and slender herbage. Here, too, the spider, bee, and fly orchises are quite common.

In the Isle of Wight, on the high downs near an open sea, or on the level inland plains of Wiltshire, or on the slopes of Brighton, Bognor, or Kent, in every variety of position and climate, the same plants maintain their position on chalk, and scarcely ever occur elsewhere.

Objections to this theory must be numerous. For the sake of brevity, let me simply state the most cogent, and attempt an answer, on the principles here laid down.

1. The number and variety of rocks are not in proportion to the number and variety of vegetables.

This incongruity may arise from the great fertility of plants. Thistles, for example, may produce a hundred thousand seeds, and the ferns many hundreds of thousands. Nature, by this overproduction, may have provided for the waste occasioned by loss of appropriate situation; and experience informs us, that millions of seeds do thus perish, or are laid in a dormant state among strata of sand, clay, or loam, whence they can derive no support: while simple induction would convince us that, of the many millions of seeds which never vegetate, not one half can be lost from any other cause, as weather, imperfect structure, or want of room to grow. They are possessed of means and powers to transport themselves from place to place, so various and complete as to form one of the chief objects of interest in the whole study of natural history. In the wide world there is no lack of room for its vegetable inhabitants, no lack of places which, to our views, might be benefited by a supply of vegetation; but each portion of matter has its limits, its place, beyond which it cannot proceed. Thus, then, many of the vegetable population perish, as it were, by the evils of emigration, in an unsuitable, a foreign land; and thus the accidental occurrence of a rare plant in a new and unexpected place leads, erroneously, to the conclusion that it is native there.

There are many plants purely of vegetable origin, which may almost be denominated parasite. Woodroof and wood-sorrel, for example, are met with every day feeding on the leaves of trees which are only converted into mould. The universality of vegetable soil will produce abundance of anomalies; but they are exceptions, and scarcely bear, either in variety or in nature, on the question at issue.

3. There are also many which are purely parasitical, i. e. feed on living plants. Of this nature are the well-known mistletoe, the dodders, and broom rapes, with numerous mosses, lichens, and fungi. Of the fungi, a most extensive class are known to subsist on leaves and stems of certain genera, or their species, or even particular varieties. This last is an untravelled field in botany, touched on by Dr. Greville of Edinburgh in his late work, and ably illustrated by a *Hortus Siccus*, with descriptions, the work of an ingenious and modest man, the curator of the physic garden at Oxford.

4. Or lastly, these anomalies are few, and not plentiful, where they occur. Now, I contend, that the proper habitat of a plant is where it is found growing freely and constantly.

Manchester, October, 1829.

PART II.

REVIEWS.

Art. I. *Cours de l'Histoire Naturelle des Mammifères.* Par M. Geoffroy Saint-Hilaire. Paris, 1829. 1 vol. 8vo.

This work contains the lectures which its celebrated author delivered, in 1828, at the Jardin du Roi. They were published separately immediately after their delivery, not with the permission merely, but under the superintendence of the Professor, to satisfy, as he tells us, the eager longings of the Parisians after useful knowledge; and have none of those inaccuracies which disfigure the lectures reported in the hebdomadal periodicals of our own country.

A principal object of the author is to defend and illustrate a theory of animal organisation which properly originated with him, and of which he continues to be the most able advocate. The theory is, that all animals are constructed after one model, or, in other words, the organisation of them may be reduced to a uniform type; so that every part which is found in each class has an analogous part in the other classes. It is admitted that the parts considered analogous in two animals somewhat distant in the scale of being are apparently very dissimilar in form, and are appropriated to seemingly different functions; but, on attentive examination, intermediate forms appear, and the one slides insensibly into the other, every change bringing with it a corresponding modification of the uses of the part. All the bones, for example, in the cranium correspond to one another in all animals which have a cranium; not in figure or proportions, for in that they obviously differ; nor in use, for a slight alteration of form is often accompanied with a change in function; but they are analogous in number, and essentially in position and structure. Thus, by comparing the fœtal head of a quadruped with that of a reptile, Saint-Hilaire discovers relations in the number and arrangement of the component pieces, which were not previously perceived. In the same manner, the os quadratum in birds is proved to be analogous to the tympanum of the mammalia; and the bony or scaly appendages to the branchiæ of fish, which are known by the general name of opercula, and are concerned in the mechanism of the respiration of these animals, are the analogues of the four ossicles of the ear in the mammalia, birds, and reptiles. The results at which the author arrives are startling, and at first view improbable; but the reader is captivated by the ingenuity of the reasoning, and the acuteness of the observer; nor is he unwilling to follow him even when he goes on to prove that the character which is supposed to separate the vertebral from the invertebral animals has nothing in it real and discriminative. The link which binds these primary divisions of modern arrangements are not the Cephalópoda, as Cuvier's system might indicate, nor the Heterópoda, as Lamarck might have it; but it is formed with the Crustàcea, which, according to Saint-Hilaire, approximate fishes by many analogous characters of great weight. Thus, in both crabs and fish, respiration is performed by the means of compound branchiæ acting in the same way. The digestive organs, those even of generation, and, in general, all the systems essential to the preservation of the individual, or to the continuance of the species, present the same sort of analogy. But have the Crustàcea an osseous system? Have they a vertebral column? Saint-Hilaire replies in the affirmative; and points out, with much ingenuity, the essential sameness and analogies of the shell and skeleton. The rings of the shell are compared to the rings of the vertebræ of the tortoise in particular; and arguments are deduced from this resemblance, from the phenomena presented in the growth of the vertebræ in general, and from some particulars of structure observed in monsters, &c., to prove that the external position of the shell, so far from presenting any difficulty, is, in fact, in perfect accordance with the theory, the shell being analogous to the vertebræ of the higher classes in a fœtal state. As for the difference in their chemical composition, this, it is replied, is only in the proportions of the component salts, and not in any difference in the nature or quality of them. And, in truth, what "en dernière analyse" is a bone but a salt, composed of phosphate of lime in the higher, and of carbonate of lime in the lower animals?

This doctrine, as we have already mentioned, was first published in a consistent and philosophical form by Saint-Hilaire, who has many disciples in France, and a greater number in Germany; where, indeed, some vain attempts have been made to rob him of the merit of originality, or to share that merit with him. The doctrine, however, has likewise its opponents, and among them is Cuvier, a host in himself. To this prince of naturalists it seems untenable, even when restricted in its application to the vertebral animals; and he sees in many of their analogies more of the fancy of the poet than the sobriety of the anatomist. To enter into the discussion were to presuppose, on the part of our readers, a more minute knowledge of anatomy than it would be reasonable to presume they possessed; and they might deem a little presumptuous the tiny reviewer who offered his umpirage in a debate between combatants of such fair renown. We will remark, however, that the theory seems to have been not the offspring of observation, but the child of fancy, or of reason if you will, nursed up by observations made for this view; and, in this case, it is obvious that what to the strong in faith may seem very twin, or at least analogous in most points, may show very differently to the unconcerned, and to the unbeliever present a contrary aspect. Cuvier cannot see any similitude between the ossicles of the ear and the opercula of fish: to Saint-Hilaire no analogy is more patent. Cuvier sees numerous and important distinctions between the vertebral and invertebral animals: Saint-Hilaire believes the analogies between them so many and so weighty as to shake to its foundation the arrangement of the *Règne Animal.*

The opinion we may entertain concerning the validity of Saint-Hilaire's hypothesis does not affect our opinion of the merits of the book; it is in the highest degree interesting: nor must our readers conclude, from what we have said, that it is merely an *ex parte* exposition and defence of the doctrine of unity of composition. Throughout, indeed, that end is kept ever in view; but of the twenty lectures, including the preliminary discourse, which form its contents, six are on the structure and habits of the ape tribe, one on the lemurs, three on the bats, and five on the mole. Every one of these lectures is full of original views, at least of views little known in our country; and the subjects altogether are discussed in a manner of which, we regret to add, we have no example in the English language. To the lectures on the mole we shall probably return on a future occasion; at present we must finish this notice with some remarks on the habits of the crocodile, as a specimen of the digressions which occasionally occur in the lectures devoted to the general subject.

The crocodile, although furnished with a lung more perfect than that of any other reptile, is little excited by the use of that organ. On the land, where it breathes by the lungs only, it is timid, and has no confidence in itself, seizes its prey at unawares or by stratagem, provides previously for security in case of resistance, and on any alarm hastens to throw itself in the water. Here it is quite another animal: its energy is extreme; its swimming rapid; and, rash even to excess, there is no enemy which it fears openly to attack, and " none is so fierce that dare stir him up." But all vitality, all muscular energy, depends on the act and effects of respiration; and how are these habits of the crocodile to be reconciled with this law? On land, when breathing the atmosphere at full, he is sluggish and fearful; it is only when immersed in water, and where respiration is liable to be impeded, that he acquires strength, activity, and courage. There is here an exception to the law, but it is only in appearance; and it is curious to remark how simply nature in this case enlarges the respiratory organ and function, and gives to the aquatic creature its corresponding power, without deviating in any thing from the one model of organisation. By means of two canals, which take their origin in the cloacum, and which open into the cavity of the peritoneum, water is conveyed within the abdomen to act upon the blood in its vessels; and through the abdominal vessels, thus called upon to aid the lungs in oxygenating the blood, the additional vigour to the muscular system is imparted. The crocodile has an abdominal sternum independently of its pectoral sternum: each sternum and its muscles regulate the effects of their proper and respective respiration. When the animal is on land, it is the thorax and its sternum which are only in action: when in the water, the abdomen and its sternal apparatus are likewise called into play. Isidore Geoffroy Saint-Hilaire and Joseph Martin were the discoverers of the canals which open into the peritoneum; a discovery of great interest, as previously to it the habits of the crocodile were inexplicable.

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ART. II. *A Geological Survey of the Yorkshire Coast, describing the Strata and Fossils occurring between the Humber and the Tees, from the German Ocean to the Plain of York.* By the Rev. George Young, A.M., assisted by John Bird, Artist, Members of several Local Philosophical Societies. Second Edition, 1828.

THE district which this volume is proposed to illustrate is inferior to few portions of our island in geological interest, as it regards what are commonly termed the secondary formations, or those which contain organic remains, from the chalk to the lias inclusive. " Nowhere," the authors observe, " have the fossil relics of animals and vegetables been found in greater variety and abundance. Almost every stratum teems with substances formerly endowed with life and motion; and the fossil conchology of the district might, of itself, occupy a large volume. Hence, not only the mere geologist, but the student in natural history, may here find an employment adapted to his taste, in comparing the recent productions of nature with those which have been embedded in the bowels of the earth, and which are fitly regarded as the medals of nature's history." The authors, who had previously occupied themselves in preparing the geological portion of *The*

History of Whitby and its Vicinity, take credit to themselves for the patient and persevering investigation which they have pursued in their more extended survey of the whole coast, from the Humber to the Tees.

To render this work more perspicuous, it is arranged into three parts. The first purports to be a description of all the strata exposed along this line of coast, illustrated by a map and section. The second part is devoted to an enumeration and description of the petrifactions, their formations or strata, and their localities. This portion is illustrated by seventeen coarsely executed lithographic plates. The third, and least useful part, contains sundry observations, hints, and conjectures on the phenomena presented; and the authors' speculations on the structure of the earth, and on the subsequent destructive operations which are traced on its surface.

In justice to the compilers of this volume, it ought to be stated, that the first edition appeared at a time when the science was somewhat less matured than at present; when the structure of this country, and the nomenclature and arrangement of the strata, were not so extensively determined as now. Enquirers were inclined to receive with thankfulness every contribution to a science daily becoming more popular; and the critic was less disposed, at that period, to question the attainments of the author or the skill of the artist. Certainly, we might avow ourselves to be amongst those who entertain doubts on both these points; but it forms no part of the plan of the Magazine of Natural History to treat with unnecessary severity the productions of any advocate of philosophical enquiry, or to decry the labours of our fellow-students.

Holderness, the southern portion of this district, is covered by a great irregular thickness of what is termed "alluvium." This covering appears to bear a close resemblance to that great deposit which is distributed over the greater part of the counties of Norfolk and Suffolk; and; like it, contains interspersed and rounded fragments of almost every known rock. The description of the Holderness range of cliffs would almost equally apply to that which extends from near Harwich, in Essex, to the west of Cromer, in Norfolk; except that, in the former, postdiluvian deposits are more extensive.

We looked for some more ample account than we have hitherto possessed of "the submarine forest," which has been frequently described by other writers as stretching extensively along this coast, and even far into the interior, and which has derived its appellation from the circumstance that beds of peat containing trees occur, in many instances, below the level of the sea at low water. But we find that the authors of the *Geological Survey* are of opinion that this woody stratum is not universally continuous, but that it occurs only in certain spots or patches, the greater part of the coast being free from these vegetable remains. "The largest of the patches occur where the cliff is very low, or where there can scarcely be said to be any cliff at all; and those small patches which occur where the cliff is lofty, as between Sandley Mere and Hornsea, are not found at the foot of the cliff, or within reach of the tide, but always a few feet below the surface." From certain facts which are enumerated, it is concluded that "these supposed remains of submarine forests are only the bottoms of fresh-water lakes, or meres, which the sea has broken into, and drained." The accuracy of this conclusion can only be ascertained by a careful examination of the coast.* This cannot be pursued with the ordinary rapidity of a geological survey. In a range of cliffs, composed of loose materials, incessantly slipping, attached by the sea in front, and by the land-springs in the rear; its actual face covered by a sloping talus, which is only removed at intervals, and during very short periods, by high tides; opportunities of examining the entire section, especially near the base, are unfrequent, even to a resident.

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* It is only since the above paragraph was written that Mr. Phillips's section and description of the Yorkshire coast has reached us. He bears testimony to the accuracy of the views of his predecessors; and we acknowledge that he has perfectly established the case as to lacustrine deposits in Holderness.

That such a woody stratum does in reality exist along the Norfolk coast, covered by a vast and irregular thickness of diluvium, is now, we believe, satisfactorily established; but, from the circumstances alluded to, it is rarely extensively displayed in continuity. During his summer excursion, the geologist might pass beneath these cliffs, and in vain look for that subterranean forest of which he has read; or he would perceive its indications only at distant intervals, and be inclined to report that there, as in the Holderness cliffs, it existed only in spots or patches. Had the same geologist possessed facilities for observation during a succession of years, in the stormy months, in the season of wintry gales and of turbulent seas; had he noted the indications as from time to time they were developed, he would have ascertained that there is scarcely a point along the whole Norfolk range of cliffs where this ligneous bed has not been laid bare.

Our limits will not permit us to follow the details of all the strata described by Messrs. Young and Bird. The chalk formation, as next in succession, follows. We may observe, in passing, that we found some difficulty in ascertaining from this work what is the dip or prevailing inclination of the chalk in this district. The authors describe it as dipping, "not in one direction only," but declining from the Wolds towards a common centre in Holderness; that is to say, south at Flamborough, south east at Driffield, and east near the Humber. This angle is in some places given as 100 ft., in others less than 15 ft. in the mile. The authors here appear to have mistaken the surface inclination of the chalk, for the direction of its plane, or of its beds. It is obvious that these may be very different things, and by no means coincident; because the slope of the strata may even be in one direction, while the dip of the surface is in another. Here it involves a manifest incongruity, where the reader is informed at p. 51., that "the dip of the chalk strata" near Flamborough "is 100 ft. per mile;" and, at p. 54 and 55., that "it lies in horizontal or at least flat strata."

We pass over several pages descriptive of various sandstones, oolites, and shales, the attempt to identify which with corresponding strata in our southern counties would occupy too much space. Hood Hill, and some others of a larger size, at Hawnby and Bilsdale, are stated to resemble haystacks in form. "Similar insulated elevations are found between Silphoue Moor and Saltergate, the most remarkable of which are Langdale End and Blakey Topping. These hills are not round, but oblong, like haystacks. They have flat summits, and smooth, sloping sides corresponding with the fronts of that range from which they are detached." (*fig.* 105.)

Several instances are furnished of living toads having been found within solid blocks of sandstone, in the Yorkshire quarries. "We are the more particular in recording these facts," the authors observe, "because some modern philosophers have attempted to explode such accounts as wholly fabulous."

The vegetable fossils of the district are illustrated by three plates, but no attempt has been made to give the scientific names to these figures, or to those representing zoophytes, and they are all far too coarsely executed to form any real acquisition to this department of natural history. Plates V. and VI., containing encrinites and echinites, are wretched productions. Eight plates exhibiting fossil testaceous remains follow, after which are sketches of fossil saurian animals, or reptiles.

A noble specimen of fossil crocodile was discovered in the Alum Cliff in 1824; and after great labour in taking it out, and subsequently clearing away portions of shale that adhered to it, and rearranging the parts which

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Bride Stones.

had been broken, it was deposited in the Whitby Museum. The entire length of this animal was rather more than 18 ft.

The second portion of the work concludes with an account of the celebrated Kirkdale Cave, and the author's reasons for differing from Dr. Buckland's interesting explanation of that geological phenomenon. We have no room to discuss the theoretical part, which occupies the third portion; and, on the whole, the volume would probably have been of equal or greater value without that appendage. — *T.*

Art. III. *Catalogue of Works on Natural History, lately published, with some Notice of those considered the most interesting to British Naturalists.*

Britain.

Anon.: The British Naturalist; or Sketches of the more interesting Productions of Britain and the surrounding Sea, in the scenes which they inhabit; and with relation to the general Economy of Nature, and the Wisdom and Power of its Author. Vol. II. The Year—Spring, Summer. London. 8vo. 1830.

We record the publication of this agreeable and instructive volume, intending to review it at length when we shall have more room.

Thompson, John V., Esq. F.L.S., Surgeon to the Forces, Author of a Memoir on the Pentacrìnus europæ'us, &c.: Zoological Researches and Illustrations; or, Natural History of nondescript or imperfectly known Animals. In a Series of Memoirs. Illustrated by numerous Figures. Cork. 8vo. Nos. II. and III.

These numbers contain some very interesting discoveries, which will be noticed in our next.

Loudon's Hórtus Británnicus, &c.; enumerating nearly 30,000 Species in the Linnean Arrangement, and nearly 4000 Genera under the Jussieuean System. London. 8vo. 1*l.* 1*s.*

The merit of this work belonging more to others than to ourselves, we hope we shall not be accused of egotism for stating that we believe it to be by far the most perfect work of the kind, both in plan and execution, that has ever been produced.

Gorham, George Cornelius, B.D., late Fellow of Queen's College, Cambridge: Memoirs of John Martyn, F.R.S., and of Thomas Martyn, B.D. F.R.S. F.L.S., Professors of Botany in the University of Cambridge. London, 1830. 8vo. 10*s*. 6*d*.

This work contains a number of facts, and some curious particulars connected with the progress of botany in this country during the last century, and will therefore repay the perusal of the naturalist.

Richardson's Zoology of Northern British America. 4to. 1*l*. 11*s*. 6*d*. boards.

Selby, P. J., Esq., F.R.S.E. F.L.S. M.W.S., &c.: Illustrations of British Ornithology, in Two Series, — viz. I. Land Birds; II. Water Birds. First Series contains 7 parts of 160 figures. Second Series contains 7 parts of 84 figures. 5*l*. 5*s*. col.; 1*l*. 11*s*. 6*d*. plain.

Bennet's Fishes of Ceylon. In 4to Numbers, monthly. 1*l*. 1*s*. No. V. contains: 21 to 25. Tétrodon ocellàtus, *P*érca argéntea, *S*càrus quinquefasciàtus, *S*. Geó*rgii*, Chæ'todon Tyrwhítt*i*, beautifully coloured as before.

Brown's Conchology of Great Britain and Ireland. Elephant 4to, comprising 52 coloured plates, and upwards of 1000 figures; half-bound morocco. 6*l*. 16*s*. 6*d*.

Greville, Dr.: *A*'lgæ Británnicæ, with Plates illustrative of the Genera. Edinburgh. 8vo. 2*l*. 2*s*.

This truly original and interesting work will be reviewed at length in an early Number.

Lindley, John, F.R.S. &c., Professor of Botany in the London University: An Outline of the First Principles of Botany. 12mo, pp. 106. 1830. 3*s*.

A philosophical, useful, condensed, and valuable little book; and superior to any thing of the same kind in the English language. — ☞

An Introduction to the Jussieuean System, by the same author, is far advanced.

Castle, Thomas, F.L.S., Member of the Royal College of Surgeons, &c.: An Introduction to Systematical and Physiological Botany. Illustrated with explanatory engravings. London, 1830. 12mo. 12*s*. 6*d*.

Chandler, Alfred, and *W. B. Booth,* A.L.S.: Illustrations and Descriptions of the Plants which compose the Natural Order Camelli*èæ*. London. Imperial 4to. Parts I. II. III. and IV. 10*s*. 6*d*. each.

A splendid work, accurate, scientific, and sold at a price barely sufficient to pay the cost of getting it up.

Wallich, Dr.: Plántæ Asiáticæ Rariòres. London. Folio. Parts I. and II. Most splendid, and remarkably cheap.

Sowerby's Supplement to English Botany. London. 8vo. Nos. IV. to VII.

Lyell, Charles, Esq., F.R.S., For. Sec. to the Geol. Soc., &c.: Principles of Geology, being an Attempt to explain the former Changes of the Earth's Surface, by Reference to Causes now in operation. London, 1830. 2 vols. 8vo.

This is a most elaborate work, and, coming from the Foreign Secretary of the Geological Society, may be considered one of authority. It cannot fail to be in universal repute, and will soon be translated into the French and German.

PART III.

MISCELLANEOUS INTELLIGENCE.

Art. I. *Natural History in Foreign Countries.*

GERMANY.

The German Naturalists and Physicians hold their eighth Annual Meeting at Heidelberg on the 18th of September. Professor Tiedmann was chosen first manager, and opened the assembly with a discourse on the progress of the natural sciences, their present state, and their influence on civil society. Among these influences some of the most important were, a taste for facts instead of hypothetical reasoning; a love of truth, from observing the fitness of means to ends in natural objects; and universal charity, from observing the care bestowed by the Author of nature on all his works. Mr. Brown of London and Professor Whewell of Cambridge were present. Professor Lichtenstein delivered the accustomed valedictory oration, concluding with the following words: — "We now take leave of you, and of this friendly abode of science, with feelings of the most grateful recollection of the abundant and various information and enjoyment which our meeting has again afforded us on this occasion. Neither the banks of the Elbe, nor those of any greater or smaller stream that we may visit in the sequel, will ever be able to efface or to obscure the lively image which we now carry away with us from the wood and vine-covered hills of the Neckar." (*Foreign Quarterly Review*, p. 352.)

Hamburgh was appointed the place of meeting for the year 1830.

George Dahl, the noted insect dealer of Vienna, whom we were disappointed in not seeing, when we spent a fortnight in that city last September, lately returned through Florence from an eighteen months' tour in Calabria, Sicily, &c., with a rich harvest of insects which he has collected for sale, to add to his former stores enumerated in his *Coleóptera and Lepidóptera* (Vienna, 1823, 8vo), a catalogue of 104 pages, specifying about 6000 species, at prices generally very moderate: 4 to 12 kreutzers (1*d.* to 3*d.*), for common species, and 15 to 30 for the rarer only. Very few exceed a florin (2*s.*). — *W. S. Florence, April* 2. 1830.

SWITZERLAND.

The Swiss Naturalists held their last Meeting in July at the Monastery of the Great St. Bernard. More than eighty naturalists attended from the different towns and cities of Switzerland; a great number of strangers were also present. Three meetings were held; various excursions made in the neighbourhood, and two entomologists from Lausanne collected more than 2000 species of insects. "A letter from one of the German naturalists present has been published in the *Morgenblatt*, in which it gave us pain to observe the following remark on our countrymen: — On the first evening after their arrival at the Monastery, the strangers, and particularly the Germans, very soon became acquainted with each other. New groups were formed every instant. A frank and cordial gaiety, the result of mutual kindness, soon prevailed among us. *The English alone remained strangers* *to these movements, and constantly kept themselves aloof.*" (*Foreign Quarterly Review*, No. ix. p. 354.)

AFRICA.

South African Institution. Aug. 31. 1829.—The following papers were read:—

1. Remarks on the Advantages of having a Botanic Garden near Cape Town; by Mr. Bowie. The author, in this communication, pointed out the occurrence of frequent failures and much uncertainty in the transport of living plants to Europe, whether transmitted from the interior of this colony or from countries to the eastward of it, in consequence of there being no such repository here to afford them a temporary resting-place, when circumstances might be unfavourable to their farther progress. He then noticed the existence of peculiarities in certain classes of Cape plants, which rendered such an establishment particularly to be desired in regard to them; and having illustrated the general advantages of thus collecting and arranging plants, to afford the means of elucidating their character and affinities, he concluded by remarking the benefits likely to arise from such investigations to science, commerce, and domestic economy.

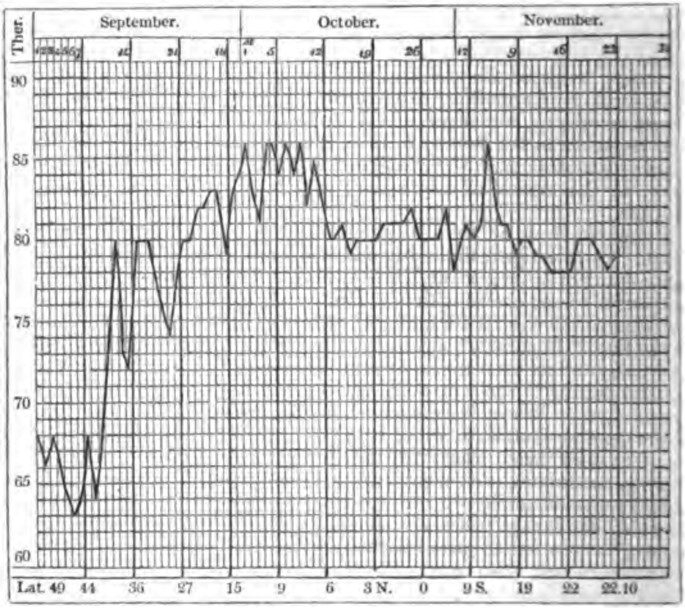
2. Sketches of the Botany of the Cape District, No. 1.; by Mr. Bowie: containing a catalogue of the indigenous plants which may be expected to flower in the month of September; with remarks on their peculiarities, uses, &c.

3. Observations on the Origin and History of the Bushmen; by Dr. Smith. In this paper, the writer adduced reasons for believing that bushmen existed even long before Europeans visited South Africa, and that they had possibly been coeval with the Hottentots themselves. He mentioned that communities or families, of a character similar to what we understand by the term "Bushmen," inhabit all the barren wastes of Great Namaqualand, and conduct themselves, towards the Hottentots and Damaras in their vicinity, exactly as those immediately in advance of our frontier do towards the colonists. It was then stated that the majority of them are decidedly of the genuine Hottentot race; and, after some very interesting details in regard to their mental character, external physiology, and modes of living, hunting, conducting their depredations, &c., the paper concluded with "an earnest recommendation to such members as may have been in the habit of observing our savage tribes, to embody their remarks for occasions like the present," as tending to personal and general benefit. The reading of four other papers was, from want of time, deferred till next monthly meeting. (*South African Advertiser*, Sept. 5. 1830.)

NORTH AMERICA.

Extensive Coal Fields.—We are informed by a very intelligent American gentleman, recently arrived from the United States, that it is confidently believed that beds of coal of various qualities extend from the central parts of Pennsylvania westward for four hundred miles, and to a great distance north and south. At present the flourishing manufactures of glass, iron, &c., at Pittsburgh, are supplied from mines in the neighbourhood, which appear exhaustless. To this great repository of coal the United States must look forward for their future prosperity and comfort as a manufacturing nation; for the immense forests that once covered the eastern states have almost disappeared. The nearest considerable extent of woodland to Philadelphia is 120 miles distant from that capital. The citizens of the United States are now much on the alert in quest of their hitherto neglected mineral treasures, and a taste for the cultivation of geology is becoming prevalent. A reprint of the third edition of Mr. Bakewell's *Introduction to Geology*, under the superintendence of Professor Silliman of Yale College, has just issued from the press of Messrs. Howe of Newhaven, the execution of which is very creditable to the American book trade. The Professor states, in his preface, that he believes he is rendering a service to his country, by encouraging the republication of this valuable work, conspicuous for its perspicuity and attractiveness: "but my immediate motive," he says, "for recommending this republication was, that I might place in the hands of my own classes a comprehensive treatise on geology, which they would be *willing* to read, and able to understand." — *N. D. December* 15. 1829.

SOUTH AMERICA.



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Sir, I embrace this opportunity of sending you a few remarks which I have made on the voyage as far as this place; if they are worth a place in your Magazine, I shall be obliged by your noticing them. I am sorry to say that our stay at Rio is only for a few days, to replenish our water, otherwise I should have been able to give you an account of the museum and botanic garden. The above (*fig.* 106.) is a diagram of my journal of the heat of the atmosphere since we left London. The height of the thermometer was taken regularly every day, between the hours of twelve and one at noon; the difference of latitude you will see at the bottom for every seven days. We had but very little rain, and that between the seventh and third degrees of north latitude. I have also remarked, that the thermometer seldom fell more than three or four degrees below the meridian heat between the tropics. When in lat. 9 N. and long. 22 W., the 7th October, we were visited by a couple of swallows (*Hirúndo rústica*); they appeared tired, and settled several times on various parts of the rigging; on the 8th they were joined by two more. In the course of the day some cheeses had been on deck to air, and had left a number of small flies (Tyróphaga càsei *Curt.*), which they soon discovered. It was pleasing to see their quick and varied evolutions, as they darted through the rigging, and not unfrequently within a few inches of our heads, after the flies. They appeared quite cheerful, and chirped with as much glee as if on the margin of a pond, and at dusk they took up their lodging in the rigging. They continued with us till the 16th; but for the last two or three days appeared much weaker, frequently settling within a few inches of the man at the helm, and suffering themselves to be taken.

The fruit and vegetable markets of this place are well supplied. Amongst the vegetables I observed excellent cabbage, lettuce, plain parsley, water-cress, white radishes (red radishes, but very small), mint, sage, rosemary; of capsicums, the C. ánnuum, C. gróssum, and C. baccàtum, and another small yellow species, I think new; of tomatoes, the small red; fruit of the egg plant, yams, Convólvulus *Batàtas*, and *A*'rachis hypogæ'a; of gourds and squashes several of the varieties common in England. The fruit is not in such variety, as many of them are not in season. I observed the following kinds: cocoa-nuts, guavas, jambos (Eugènia *Jámbos*), oranges, very large and sweet, rather scarce at present, bananas, and tamarinds. Pine-apples are just coming in, two thirds of a dollar each; and of grapes I saw only one basket. In all the gardens round the suburbs, the Coreópsis tinctòria seems as universal a favourite as in England. Some of the gardens are laid out with some taste, but contain fewer species and varieties than might be expected in a country like this. In the public garden, on the road to Cateta, are some very fine specimens of the indigenous trees; the *S*álvia spléndens seems to be a favourite here, and also the *H*ibíscus *R*òsa sinénsis; the latter is in every garden. On my arrival at Balparays, I hope to be able to send you something of more interest than the present. In the mean time, believe me, Sir, &c. — *A. Matthews. Rio de Janeiro, Nov.* 23. 1829.

Art. II. *Natural History in London.*

The Geographical Society of London. — This Society seems to have been originated by John Barrow, Esq., of the Admiralty, a gentleman who, during a long life, seems to have devoted every spare moment of it to the advancement of geography; perhaps we should rather say chorography: because geography, in the modern sense of the word, includes statistics, more or less of natural history, the general history and present state of the human species; and, in short, the moral and political, no less than the physical state of the earth's surface. At a Meeting held May 24th, John Barrow, Esq., in the chair, the objects of the Geographical Society were declared to be: —

1. To collect, register, and digest, and to print, for the use of the members and the public at large, in a cheap form, and at certain intervals, such new, interesting, and useful facts and discoveries as the Society may have in its possession, and may, from time to time, acquire. — 2. To accumulate gradually a library of the best books on geography; a selection of the best voyages and travels; a complete collection of maps and charts, from the earliest period of rude geographical delineations, to the most improved of the present time; as well as all such documents and materials as may convey the best information to persons intending to visit foreign countries; it being of the greatest utility to a traveller to be aware, previously to his setting out, of what has been already done, and what is still wanting, in the countries he may intend to visit. — 3. To procure specimens of such instruments as experience has shown to be most useful, and best adapted to the

compendious stock of a traveller, by consulting which he may make himself familiar with their use. — 4. To prepare brief instructions for such as are setting out on their travels; pointing out the parts most desirable to be visited; the best and most practicable means of proceeding thither; the researches most essential to make; phenomena to be observed; the subjects of natural history most desirable to be procured; and to obtain all such information as may tend to the extension of our geographical knowledge. And it is hoped that the Society may ultimately be enabled, from its funds, to render pecuniary assistance to such travellers as may require it, in order to facilitate the attainment of some particular object of research. — 5. To correspond with similar societies that may be established in different parts of the world; with foreign individuals engaged in geographical pursuits, and with the most intelligent British residents in the various remote settlements of the empire. — 6. To open a communication with all those philosophical and literary societies with which geography is connected; for as all are fellow-labourers in the different departments of the same vineyard, their united efforts cannot fail mutually to assist each other. — 7. And lastly, in order to induce men of eminence and ability in every branch of science, literature, and the arts, and in particular those who have travelled by sea and by land, and all such as are skilled in geographical knowledge, and likely to become useful and efficient members, it was suggested that the admission fee and annual contribution should be on as moderate a scale as, with the number of subscribers calculated upon, would be sufficient to enable the Society to fulfil the important objects herein alluded to.

A provisional committee was appointed, who, on May 26th, agreed to a number of resolutions; among others, that as soon as 300 subscribers could be obtained a president and officers should be elected; that the admission fee of members should be 3*l.*, and the annual subscription 2*l.*; and that a composition of 20*l.* shall be a substitute for the entrance-money and annual payment. Commander M'Konochie, R.N., was appointed provisional secretary; and the Society's Office in the mean time is at 99. Quadrant, Regent Street.

We have always said, that the principal use of societies in the present day is to bring together people who are occupied in the same pursuits. Something is also effected in the way of stimulus; but the great use of a society, and that alone, in our opinion, which can justify it in attempting any thing as a body, is in effecting, or endeavouring to effect, that which individuals in general could not undertake of themselves. Many statistical enquiries may certainly be considered of this description; because the documents which must be had recourse to will not often be entrusted to individuals; and the publication of the result, after it has with infinite labour been condensed into perhaps a tabular view of a few pages, will nothing like remunerate either an author or a bookseller. The main object of geographical enquiries, in the extensive sense in which the word has been employed since the time of Pinkerton, is to make any one and every country thoroughly acquainted with any and every other country, physically, morally, and politically. "To prepare brief instructions for such as are setting out on their travels" (Art. 4.), is one of the objects of the Geographical Society; and, if it can induce tourists to acquire a thorough knowledge of the language of the countries through which they intend to pass, and to collect facts, in addition to the usual observations, the service to the public will be considerable. After fifteen years of peace, how very little do we know of the statistics of Germany, of the state of education and morals through that extensive and very interesting country; and of the state of morals, politics, and education in Sweden! The voluminous travels of Dr. Clarke scarcely touch on these subjects. One reason is, that very few Englishmen who travel know any thing of the German language. Of the numerous works in that language on statistics we know little, except what has been from time to time given by the editor of the *Morning Chronicle*, the only newspaper editor in London, we believe, who thoroughly understands German, and more recently in the *Westminster* and two *Foreign Reviews*. The Geographical Society will unquestionably render good service to their country, by translating and concentrating information of this sort: but, as it is with an unpalatable medicine, the good will be in the final result, and not in the commencement. It will not be palatable to the true-born Englishman to feel, that the more he knows of the laws and institutions and state of morals of other countries, the more he must lower his exalted notion of his own. Estimating, however, the happiness of every country, in Mr. Bentham's manner, by the happiness of the greatest number, France, America, Sweden, Switzerland, and Germany are all much happier countries than England; unless, indeed, the happiness of a country consists merely in the happiness of its aristocracy. With a view, therefore, to the great changes preparing for this in common with other countries, and foreseeing no chance of the Geographical Society ever becoming very rich; for it has chiefly the attraction of public utility, and not that of personal honour like the Royal, or personal advantage (fruits, seeds, plants, books, and saving a nurseryman's bill,) like the Horticultural, we sincerely wish it success, and will give it all the support which lies in our power.

One object (Art. 6.) is, "to open a communication with all those societies with which geography is connected:" in this we sincerely rejoice, because it is liberal on the face of it; and because we believe the Geographical and Statistical Society of Paris, and also another party in that city, have collected much statistical information, which, if translated and printed "in a cheap form," would be useful in this country. — *Cond.*

The Labels in the Zoological Society's Gardens. — Pray suggest that these labels, besides bearing the name, country, and year of introduction or scientific name of the animal, should also bear the name of the donor, when it has been a donation. This, I think, is the least compliment that can be paid to donors; and I know some who are much offended at its neglect, and will not repeat their gifts. — *J. M. May* 1. 1830.

The Zoological Farm. — I was the other day at the Zoological Farm, where things are not going on very prosperously; for, with the exception of the dromedary, a rein-deer, and the llama, which are come down for change of air, the stock has not increased since last autumn. Some new enclosures have been made this spring for the poultry, and two huts, which serve as shelter for some of the sheep, the llama, &c.; but, as Mr. Burke observed the other day at the Meeting, "Subscribers need only go to look at the farm, to see what a miserable concern it is." With its locality, of course, you are well acquainted; the shrubbery walks are beautiful, and the view from the grounds magnificent. The hen-houses, rabbit-hutches, pigeon-houses, &c., are all built in the neatest manner, but the stock does not appear to thrive. Last year they had a great number of lop-eared and Angora rabbits, for some of which the most enormous prices are said to have been given; but during the winter they lost a few, and as they do not permit them to increase during the winter months, their stock is at present diminished, and the greater part of them are affected by some kind of disease in their coats, which makes them look ragged and miserable.

Their poultry does not appear fine of its sort, except a few handsome specimens of the speckled Poland. The Dorking are not large; the turkeys are unhealthy; and from their whole stock they have only, as yet, produced *three* broods of chickens.

The pigeons are magnificent of their kind, and appear to flourish; but the original object of keeping them is defeated, in their being suffered to breed together, so that all of the young ones are cross-bred.

A few Indian cattle (Zebus), of various sizes, a young deer from Richmond Park, some half-bred Cape sheep, an Angora and a few other goats, a Shetland pony, and, if I recollect rightly, some silver pheasants, and Curaçoa birds, complete this collection, the future expense of which is to be *limited* to 1000*l.* a year, it having hitherto much exceeded that sum. Six men are employed on the premises, as keepers, watchmen, gardeners, &c., and most of them reside in the house, which is very pretty, and two rooms of which are reserved for the use of subscribers. There is a small green-house filled with plants, which go to decorate the garden in London; and a fishpond, which, I believe, is stocked with carp.

This is all I can tell you of the farm, the ostensible object of which is to "preserve the different races of British animals pure and distinct;" instead of which, with the exception of the rabbits, they are now all together: and thus the Society is paying 1000*l.* a year in order to maintain diseased rabbits and cross-bred pigeons, and to offer a country residence for their sickly quadrupeds, which surely might be obtained at a much slighter expense. — *Confidential. May* 29. 1830.

The Nightingale was heard for the first time this season on Sunday evening, the 18th of April, and again in another part of the Regent's Park last evening, by, Sir, &c. — *R. G. Sussex Place, April* 20. 1830.

It was heard at Bayswater and in Kensington Gardens about the 18th or 19th; there are now (23d, mid-day,) two birds singing in Hopgood's nursery, not far from our window, most delightfully; and in the evening these birds and others in Kensington Gardens may be heard from Hyde Park Corner to Kensington Gravel Pits. The bird-catchers are already watching in the lanes, and we fear will succeed, as they did last year, in capturing some of them. We certainly think the legislature ought to forbid bird-catching for a distance of twenty miles round St. Paul's, not only for the sake of the song of singing birds, but for the service which the birds render to gardens by keeping down the insects. — *Cond.*

ART. III. *Natural History in the English Counties.*

MIDDLESEX.

ARRIVAL of the Thrushes and Fieldfares. — Perhaps it may be worth mentioning, that the redwing thrushes and fieldfares arrived earlier last autumn than ever I knew them before. On the 15th of September, a large flock came into the orchard at the end of our garden, about which they remained for several weeks, feeding on the yew berries and haws, which were plentiful there. At the end of the same month the fieldfares arrived, and they had cleared the whole of the berries before the cold weather set in; and at the time that the snow lay so long on the ground, they were so distressed for food that they cleared the whole of the ivy berries when they were scarcely larger than shot, so that I do not believe there will be a ripe ivy berry to be seen in the neighbourhood of London this year. At any rate, that is the case about here, and also on the walls on and near Wimbledon Common and Putney Heath. I have this spring seen but one summer bird of passage, the willow wren, and that was on the morning of the 24th of March. I am, Sir, yours, &c. — *R. Sweet. Pomona Place, April* 6.

SURREY.

Early Appearance of Swallows. — On the 1st of this month, passing along the river-side at Barnes, in Surrey, I observed (with others) several swallows, very strong and lively, flying close to the water, although the snow was falling rather fast at the time. Several hot days had preceded, the latter end of March having been warm and fine, which might have brought them into action: none have appeared since that I know of. Supposing the time mentioned to be an early appearance, and always having observed the first appearance to be on the river, I take the opportunity of noting it. — *D. Brentford, Middlesex, April* 13.

KENT.

Birds (some of them rare) shot and collected in the immediate Vicinity of Dartford, during the last Winter: —

- Strix *O*'tus, Long-eared Owl. Shot in Dec.
  - brachyótus, Short-eared Owl. Shot in Oct.
- *C*órvus *C*órnix, Hooded Crow. The only specimen I have seen in this locality.
- Lóxia *C*occothraústes, Hawfinch. Rather numerous this winter and the last.
- *F*ringílla Montifringílla, Brambling. Several came under my observation.
- *M*otacílla álba, White Wagtail; and
  - Boárula, Grey Wagtail. Both these remain all the winter with us.
  - Rubètra, Whinchat; and
  - Rubícola, Stonechat. Both found on Dartford Heath every month in the year.
- *C*haràdrius pluviàlis, Golden Plover. Male and female.
- *A*'rdea màjor, Heron. A fine full-plumaged male.[*]
  - stellàris, Bittern. Scarce with us.
- Tántalus ígneus, Ibis. A beautiful specimen, shot in Blendon Hall Park, Bexley, on the banks of the fishpond.
- Hæmátopus ostrálegus, Oyster-catcher.
- *L*àrus marìnus, Black-backed Gull.
  - næ̀vius, the Wagel.
  - ridibúndus, Black-headed Gull.
  - cineràrius, Red-legged Gull.
- *M*érgus Mergánser, Goosander. Erith marshes.
  - *C*ástor, Dun diver. Dartford marshes.
  - albéllus, Smew. Dartford marshes.
- *A*'nas *C*ýgnus, Wild Swan.
  - fúsca. Velvet Duck.
  - nìgra, Scoter.
  - *Marílla*, Scaup Duck. Male and female.
  - *Tadórna*, Sheldrake.
  - acùta, Sea Pheasant.

The last all shot on Dartford marshes.

P.S. — Although I have personally, for the last three years, anxiously sought after, on Dartford Heath, Bexley Heath, and elsewhere in this neighbouring locality, the *M*otacílla provinciàlis, or Dartford warbler, it has been without success. The local cognomen of this little bird evidently resulted from chance, and the more indefatigable research of that eminent ornithologist and my late townsman Dr. Latham. On Saturday, April 3., I observed three swallows earlier than usual; to-day heard the wryneck (*Y*únx Torquílla). — April 8. The *M*otacílla *L*uscínia (nightingale) enlivened us with its song for the first time, last evening, in serene moonlight; the *H*irúndo ripària (sand marten) appeared to-day. — *James C. Hurst. Dartford, April* 8.

Orobánche cærùlea. — The account of the spontaneous appearance of the *E*pipáctis latifòlia in your Magazine (Vol. II. p. 70.), leads me to send you a statement of a similar fact respecting what I suppose to be the *O*robánche cærùlea, and which, in the year 1821, I found abundantly in some of the low pastures, and also some specimens in an elevated dry chalky situation, at Bishopsbourne, in Kent. I had for many years preceding been an assiduous collector of plants in this and various parts of Kent, and never before saw it, nor have I since met with it again, although my attention has been directed to the fields in which I found it. — *Anon. Bishopsbourne, March* 26. 1829.

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[*] I particularly enumerate this bird (which was run down by a boy, and captured in Bexley marshes), from discovering in his stomach *a very large-sized mature male* *M*ús amphíbius *Linn.* (water rat). It had been lately swallowed, occupying, even to distension (with portions of partially digested fish), the ventriculus of the heron. The only injury apparent to the animal was, a puncture made by the beak of the bird in the frontal part of the skull, by which life was destroyed. On referring to the only works I have in my possession on ornithology, no mention is made in any of so large a creature as the rat constituting the food of the *A*'rdea genus. I think it appears evident (as the bird was in good condition, and other food in the stomach), that, although the winter has been severe, yet necessity did not enforce such means to satisfy its hunger. The size of the œsophagus would also elicit a contradiction to its capability of such distension, if the proof were not positive. No evident cause of its easy capture existed, but the probable one of repletion.

ESSEX.

Oriòlus Gálbula and Lóxia Coccothraústes. — On the 10th of May, a brilliant specimen of the golden oriole was shot by the gamekeeper of H. Greene, Esq., of Lawford Hall, near Manningtree, Essex. It had in its stomach the remains of a *S*carabæ'us *M*elolóntha, and several small green caterpillars. On the 14th of May, a male hawfinch (Lóxia *C*occothraústes) was shot in an orchard in the parish of Higham, Suffolk: its beak was of a fine deep blue colour. — *J. D. Hoy. Stoke Nayland, Suffolk, May* 25.

BEDFORDSHIRE.

The Northern Diver (*Colýmbus glaciàlis*). — A fine specimen of this very rare bird was shot in the river Ouse, about a mile from Bedford, on the 4th of February last: it weighed 4 lbs. 5 oz. It has been stuffed, and is now in the possession of the person who shot it. — *W. H. White, H. M. C. Bedford, March* 20.

SUFFOLK.

Rare Birds, killed during the Autumn and Winter of 1829 *and* 1830, *in Suffolk, and on the Borders of Norfolk and Essex:* —

Fálco *Ossífraga*, Sea Eagle. Shot in Stour Wood, near Harwich. Three other birds, apparently of the same species, frequented the rivers Stour and Orwell for some time during the cold weather.
Lànius excùbitor, Great Ash-coloured Shrike. Near Ipswich.
*P*ìcus minor, Less Woodpecker. In a garden in Ipswich.
A'rdea *N*yctícorax, Night Heron. End of October, near Bildestone, Suffolk.
A'nas glaciàlis, Long-tailed Duck. Adults and young.
  strépera, Gadwall.
  fúsca, Velvet Duck. Males, females, and young. About thirty were seen in the Stour, near Harwich: they are so expert in diving that but few were shot.
Léstris *C*ataráctes, Skua Gull.
*L*àrus glaúcus, Glaucous Gull.
*L*àrus minùtus, Little Gull. During last winter three were shot.
*M*érgus serràtor, Red-breasted Merganser. Many were shot.
  Mergánser, Goosander } Very numerous,
  *C*ástor, female Goosan. } both in the salt-water inlets and fresh water. Several young males came under my observation in a change of plumage; showing clearly the identity of *M.* Mergánser and *M. C*ástor.
A'lca A'lle, Little Auk.
Procellària glaciàlis, Fulmar Petrel.
  pelágica, Stormy Petrel.
Phalàropus lobàtus, Grey Phalarope.
Tringa pusílla, Little Sandpiper.
Pódiceps rubricóllis, Red-necked Grebe.
  obscùrus, Dusky Grebe.
*S*túrnus *C*inclus, Water Ouzel.
Gallínula *Porzàna*, Spotted Rail.

Early Arrival of Summer Birds, &c. As the arrival of some of our summer migratory birds has this season been unusually early, I send you a list of those I have observed in this neighbourhood: —

Sýlvia hippolàis, Least Willow Wren,	Mar. 18.
Yúnx Torquílla, Wryneck - -	— 31.
*H*irúndo ripària, Sand Marten. A flock of ten - - -	April 1.
rústica, Chimney Swallow. Saw four - - -	— 3.
*M*otacílla flàva, Yellow Wagtail -	— 3.
Sýlvia *T*róchilus, Willow Wren -	— 5.
*P*hœnicùrus, Redstart - -	— 6.
Atricapílla, Blackcap - -	— 7.
*L*uscínia, Nightingale - -	— 9.
cinèrea, Greater Whitethroat. Saw one - - -	— 10.
*A*laúda minor, Field Lark - -	— 14.
Sýlvia Locustélla, Grasshopper Warbler	— 14.
Rubètra, Whinchat - - -	— 15.
Sýlvia salicària, Sedge Warbler -	April 22.
*C*ùculus canòrus, Cuckoo - -	— 25.
Sýlvia Sylviélla, Lesser Whitethroat -	— 25.
sibilàtrix, Wood Wren - -	— 26.
*H*irúndo úrbica, Martens. Saw several	— 28.
Muscicapa *Grisola*, Spotted Flycatcher. Saw one (several seen May 1.) -	— 29.
*C*olúmba *T*úrtur, Turtle Dove -	— 30.
Sýlvia horténsis, Greater Pettychaps -	— 30.
arundinàcea, Reed Warbler -	May 4.
Fálco Subbùteo, Hobby - -	— 4.
Lànius *C*ollùrio, Red-backed Shrike -	— 7.
*H*irúndo *A*'pus, Swifts. Saw several -	— 10.
*P*érdix *C*otúrnix, Quail - - -	— 10.
*C*aprimúlgus europæ'us, Goatsucker -	— 14.

J. D. Hoy. Stoke Nayland, Suffolk, May 25. 1830.

HEREFORDSHIRE.

A Snipe of a novel Colour was shot in this neighbourhood, in the beginning of the present month, which is now in my possession; and though, from being severely hit, it is badly preserved, yet, as I cannot identify it with any described species, I value it as a curious *lusus naturæ;* which, I am of opinion, it must be, the length and shape of the bill, and the different marks on the head and body, corresponding, except in colour, to the lines and bars on the plumage of the common snipe (*S*cólopax Gallinàgo). The length of the bird is 11½ in.; the bill, which is 2¾ in. long, is yellow, with a brown tip; the lines on the head are of a dirty buff and dusky brown colour; the chin is of a pale reddish buff; the breast yellowish brown, and the belly white. The back of the neck, back, scapulars, and tail-coverts are of various shades of brown, yellow, and bright chestnut. The lesser coverts of the wings and quill feathers are a light dusky brown; the tail-feathers are barred with brown, chestnut, white, and yellow; the legs and feet are a light yellowish brown. The plumage is altogether composed of delicate and pleasing light shades of the colours described. I am, Sir, &c. — *J. A. Harvey. Kington, Herefordshire, Jan.* 25.

YORKSHIRE.

Yorkshire Philosophical Society. — The Anniversary Meeting of the Yorkshire Philosophical Society was held, for the first time, on the 2d of Feb., in the theatre of the new museum; which building is now completed, and reflects equal credit upon the good taste and public spirit of its projectors, being alike an honour and an ornament to the city and county.

The Yorkshire museum stands in an enclosure of about three acres, part of the site of the once rich and powerful abbey of St. Mary, which, since the dissolution, has been the property of the Crown, and was munificently granted by His late Majesty, in 1827, to the Yorkshire Philosophical Society. The venerable ruins of the abbey occupy the north-western side of the enclosure; the Roman multangular tower and ancient city walls separate it from the city to the south-east. On an eminence in the centre, the museum rears its noble front, looking down upon the river, and to the extensive landscape beyond. The entrance to the grounds, from the city, is by a Doric gateway, or propylæum, opening out of Lendal Street. On each side of the walk leading thence to the museum, the ground is appropriated to a botanic garden, which is designed to combine ornament with scientific utility. The remainder of the enclosure is laid out and planted with a view to picturesque embellishment, and with particular reference to the favourable display of the venerable remains of antiquity which adorn and consecrate the ground.

The front of the museum extends 102 ft., and was designed by William Wilkins, Esq., R.A. In the centre is a portico of four Grecian Doric columns (3 ft. 6 in. diameter, and 21 ft. 6 in. high), extending 35 ft., and projecting 10 ft., with bold steps all round it. The space on each side of the portico, which is terminated by an antæ pilaster, has three windows, ornamented by suitable architraves. A bold massive Grecian pediment is supported by the columns, and the entablature continues the whole length of the front, and returns round the ends of this building, which is about 24 ft. wide. These ends have an antæ pilaster at each angle, supporting a massive architectural screen to the roof, imitated from the choragic monument of Thrasyllus, at Athens. The whole of this building is faced with Hackness stone, from the quarries of Sir J. V. B. Johnstone, Bart., the gift of the munificent proprietor, and also the sides of the back buildings, which are lower than the front.

From the portico, the entrance into the building is by spacious folding doors, with a light over them, resembling that over the door of the Pantheon at Rome.

The internal arrangements were principally founded on a design made by Mr. Sharp, in 1825, and subsequently much enlarged and improved. The hall is 29 ft. 6 in. by 18 ft. 6 in. The floor is formed of scagliola plaster, by Mr. Ellison, in imitation of porphyry. The walls resemble stone; and the ceiling, being divided into bold panels, gives the whole a very massive and suitable effect. On the right of the hall is the library, 31 ft. 9 in. by 18 ft. 6 in.: here the books and miscellaneous antiquities belonging to the Society are deposited. A door on the left of the library leads to the staircase and council-room. Directly opposite the front door, corresponding folding doors lead into the theatre or lecture-room, 35 ft. by 44 ft. This beautiful room is ornamented by six Corinthian columns and four pilasters, supporting beams enriched by guilloche ornaments, dividing the ceiling into four principal compartments, in each of which are two rows of deep caissons; those of the two middle divisions are filled with ground-glass, through which the room is lighted. By a simple but ingenious contrivance, these lights can be instantly obscured by shutters, at the command of the lecturer, whenever any experiments require to be performed in the dark. The seats for the spectators, which are equally handsome and commodious, gradually descend from the level of the entrance-hall towards the table of the lecturer, situated opposite the entrance, and nearly on a level with the basement floor. The lower part of the lecture-room is rusticated, and the whole of the walls and part of the floor are in imitation of stone. On the right and left of the lecture-room, and communicating with it, are spacious apartments, 51 ft. 6 in. long, by 18 ft. 6 in. wide, for the collections in zoology and mineralogy; the former containing a suite of nearly 10,000 specimens of British rocks and fossils, arranged in the order of their position in the earth; the latter exhibiting above 2000 minerals, classed according to their chemical relations. At the back of the lecture-room, and connecting the two lateral rooms, is the museum for zoology, 44 ft. by 22 ft., in which the foreign and British quadrupeds, birds, reptiles, fishes, shells, insects, and corallines, which the Society possesses, are systematically displayed. These three rooms are lighted by plate-glass skylights, and are admirably suited to their purpose: they are at present only partially fitted up, as the funds of the Society do not allow of more being done.

The front building has an upper story, containing three spacious rooms, one of which is allotted to the use of the keeper of the museum, and another to the valuable collection of comparative anatomy, the property of the curator of that department, James Atkinson, Esq. The whole of the building, except the basement, is peeled by stones erected by Mr. Haden of Trowbridge, and by Mr. Pickersgill of York. Preparations are made for lighting the whole with gas. A considerable part of the internal finishings have been executed under the gratuitous direction of Mr. Pritchett.

The basement story contains a laboratory; accommodation for the lecturer, immediately communicating with the lecture-room; a dwelling-house for the sub-curator; and a long gallery, containing the architectural fragments of the abbey discovered in the late excavations. A curious old fireplace, belonging to the abbey, is preserved in its original position, in one of the basement rooms, and forms a very interesting object to the antiquary. The room being necessarily nearly dark, a gas-light is fixed to throw a feeble light upon this relic, and adds not a little to the interest it excites. (*Yorkshire Gazette.*)

Lilium Mártagon. — This plant, though not generally admitted into the British Flora, may be found in the appendix to one published by Dr. Hull of Manchester. I have a specimen from a wood near Kirby Fleetham, where it grows to all appearance wild. — *J. E. L. Richmond, March* 4.

Cumberland.

Wild Swans on the Lakes. — The queen of lakes, in our northern Tempe, Winandermere, or (as it is generally called), Windermere, and the neighbouring lakes, Esthwaite and Coniston, have had the honour of a lengthened visit from a party of *lakers* *, who, too fashionable to follow in the track of ordinary tourists, have chosen the present inclement season for their journey, and air and water as their vehicles. They have taken aquatic excursions every day since their arrival; and, indeed, live on the lakes, where their stately company, oaring their white barges on the bosom of the dark blue waters, is much admired: their noble and graceful appearance indicate high rank in their station. Their title is *A*nas; and they belong to the Caÿstrian family of swans, a wild horde, who possess large territories in the northern parts of Asia, Europe, and America. The present party consists of about 30 individuals, against whom, I am sorry to say, war has been unjustly waged, and some of them have lost their harmless lives. One of them, which came into my possession, measured 5 ft. in length, 7 ft. in breadth, and weighed 19 lbs. The peculiarity of formation of the windpipe in the wild swan has been described by more competent writers, therefore I shall not touch upon it. At a future time, I may, perhaps, furnish you with notices of several other visitors of these lakes, who deserve ornithological attention from the unfrequency of their wanderings to our inland parts, if you think them worthy of a place in your Magazine. I am, Sir, &c. — *Philagros. E. L., Jan.* 31.

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* As some of your readers may not understand the meaning of *lakers*, I beg to explain, that tourists to the English lakes are so denominated in the vicinity of these beautiful and picturesque pieces of water.

Native Gold. — Casualties, if attended to, might often impart important hints; and these, followed up, conduct to some valuable end. The late Mr. Ireton of Ireton Hall, in Cumberland, informed me, that, in carving a pullet which had been reared on his farm, he discovered a pallet of native gold in contact with the breast-bone: it was nearly half an inch square; and the probability is, that the fowl had picked it up from the bed of a rivulet which flowed through part of his estate. — *J. Murray. Carmarthen, April* 2.

HAMPSHIRE.

A fine Leopard, a striped Hyæna (a superb animal), and several antelopes, have been just landed here from the Wolf brig, a present from the Emperor of Morocco to His Majesty. Owing to the ship being nearly wrecked at the back of the Isle of Wight, the animals were nearly destroyed: the antelopes were so weak, that the sailors brought them ashore in their arms; the leopard was perfectly tame, being at large on board ship. — *H. S. Portsmouth, March* 18.

ART. IV. *Natural History in Wales.*

LONGEVITY of Men and Women.—Sir, I have sent you the following cases of very advanced age, which have occurred, since the commencement of the present year, in the principality. I should suppose that they are not equalled in any part of the British Isles; for the deaths here noticed average about 1 out of 20: at the same time, it must be remembered that the country is not very populous; and these deaths mostly occurred in the northern division, which is very remarkable for salubrity: — Catherine Hughes of Corwen, 85; William Pritchard, Anglesey, 92; Sir W. C. De Crespigny, Blaenpadernyn, 97; Rev. E. Herbert, Caernarvonshire, 83; William Rowland, Caernarvonshire, 88; Robert Owen, Caernarvonshire, 91; John Jones, Brecknock, 92; Dorothy Jones, Denbigh, 104; Hugh Rowlands, Esq., Caernarvon, 80; Jane Hughes, Beaumaris, 87; Arabella Jones, Anglesea, 82; Mary Jones, Glamorganshire, 97. These are all well authenticated, as I copied them from the provincial Welsh papers as they severally appeared. In looking over the list of deaths in the principality which occurred within the present quarter, and are noticed in the *Cambrian* quarterly, I find that, out of 40, there were 3 above 20, 6 above 30, 2 above 40, 7 above 50, 3 above 60, 8 above 70, 6 above 80, 4 above 90, and 1 above 100: giving to each of the 40 an average of 64. As the study of man is the most noble branch of natural history, it would be very desirable if your correspondents would furnish you with a table of this sort, showing the difference of longevity in the various portions of the British empire. I am, Sir, yours, &c. — *L.D.C. Oxford, April* 4.

ART. V. *Natural History in Scotland.*

RARE Plants indigenous to the Parish of Kilspindie, in Perthshire. — Sir, Permit me to point out the habitats of a few of the rare plants in this parish, which may be acceptable to the lovers of botany among your readers, and may induce others of your contributors to furnish similar lists from their respective parishes throughout Perthshire; a county which, from its varied surface, produces as many rare and interesting plants as any in the island: —

Grammìtis *Cèterach*. Den of Gothens.
Pilulària globulìfera. Whitemyre Dam.
*S*ìson inundàtum. Whitemyre Dam.
*A*lìsma *r*anunculöìdes. Whitemyre Dam.
*R*esèda lùtea. West side Annat Park.
*E*uphórb*ia* exìgua. Den of Pitroddie.
Habenària cordàta. Hill of Shanry.
ovàta. Woods, Annat Park.
viridis Whitemyre.
Botrỳchium Lunària. Green pasture, Hill of Gasconhall.
Pàris quadrifòlia. Linn of Balmyre.
Trientàlis europæ̀a. Foulford Wood.
*H*yoscỳamus nìger. Rait Hill.
*C*árduus Mariàna. Den of Kilspindie.
*C*ichòrium *I*ntybus. Annat Park.
Prìmula elàtior. Linn of Balmyre.
Aspìdium *Dryópteris*. Ladywell Park.
*Th*ỳmus *A*cynos. Old pasture and rocks near Shanry.

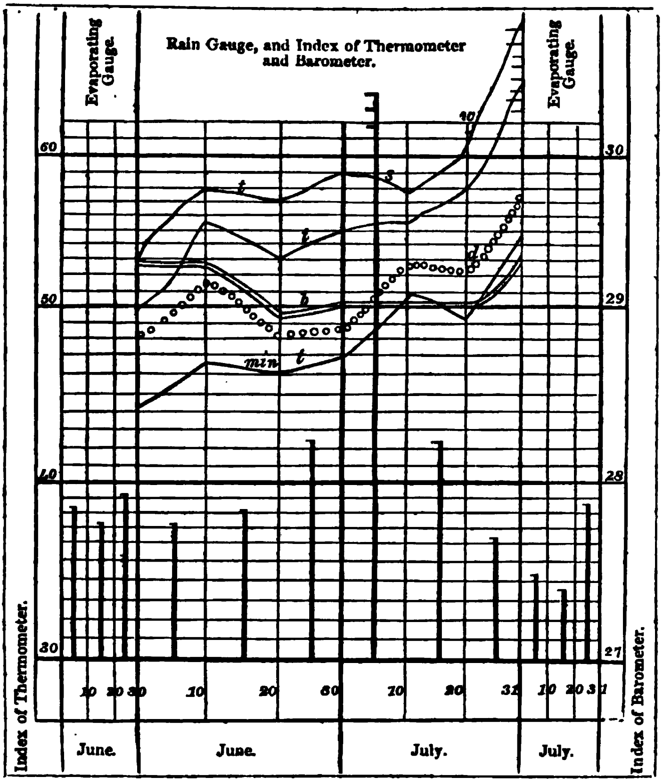
I have found several rare plants in the neighbouring parishes, not included in the above list, which, I hope, will be noticed by others of your botanical contributors. More extensive and more interesting lists of this nature might be furnished from the north and west parishes of the county, than what is produced in the parish of Kilspindie. I am, Sir, &c. — *Wm. Gorrie. Annat Gardens, Feb.* 16.

A Pair of Siskin Finches (*F*ringílla spìnus *L.*) have hatched with me this season, a thing of very rare occurrence. A naturalist here informs me that it is the first instance that has come to his knowledge. They have often been crossed with canaries. The young have left the nest about a week ago: there were three of them, but one is since dead; the other two are thriving well, and can now eat of their own accord. The old ones have got a nest again: their eggs are of a pale blue colour, sparingly marked with dark spots, which are thickest at the round end; the nest is small, but neatly built. They are a very familiar bird, sitting upon your hand, and feeding; whither also the young come, and are fed by their parents. I have got many other nests, but none of them are particularly worthy of notice, being quite common. I may mention that the birds have liberty to fly about in a room, and that they build in whin, broom, and fir branches, fixed like bushes and trees on the floor. I am, Sir, &c. — *John Milne. Edinburgh, June* 1.

ART. VI. *Calendar of Nature.*

SCOTLAND.

DIAGRAM, showing the Motion of the Mercury in the Barometer and Thermometer, and the Dew Point, or the Mean of each, for every Ten Days in the Months of June and July; also the Mean of the minimum Temperature, and of the Mean Temperature, within 6 in. of a South Brick Wall, the Thermometer being shaded; the Depth of Rain in the Pluviometer, and the Quantity of Moisture evaporated in the Evaporating Gauge, during the same period: as extracted from the Register kept at Annat Gardens, Perthshire, N. Lat. 56° 23½′; above the Level of the Sea 172 ft., and 15 miles from the Coast; being the Mean of daily Observations at 10 o'clock Morning and 10 o'clock Evening.



The double lines, marked *b*, show the motion of the mercury in the barometer; *t s w*, the mean temperature of the air, near a south garden-wall; *t*, the mean temperature in the open air and in the shade; *d*, the dew-point; and *min. t*, the mean of the minimum temperature in the open air at night.

The coldest day in June was on the 14th: mean temperature of that day 47°; extreme cold throughout the month 38°; wind E. The warmest day in June was the 27th: mean temperature of that day 59·5°; extreme heat 65°; wind S. E. There were only 5 days of brilliant, and 12 of partial, sunshine; 13 days were cloudy. The wind blew from the E. and N. E. on 5 days; from the S. and S. E. on 3 days; from the N. and N.W. on 7 days; and from the W. and S.W. on 10 days; and from due E. on 5 days. There were loud westerly winds on the 1st and 2d, and thunder and lightning on the 28th. The coldest day in July was on the 2d: mean temperature of that day 51·5°; minimum temperature for the month 46°. The warmest day in July was on the 28th: mean temperature of that day 71°; extreme heat 82°; wind W. There were 7 days of brilliant, and 6 days of partial, sunshine; 18 days were cloudy. The wind blew from easterly points on 10 days, and from westerly points on 21 days. There was a loud gale of westerly wind on the 19th, and long-continued peals of thunder on the afternoon and evening of the 30th. The mean temperature of June was 54·4°, or nearly 3° below an ordinary mean; that of July was 59·5°, or just 1° lower than on an average of the last seven years.

At the end of May, vegetation was something in arrear. The low temperature, and moisture in the soil, retarded its progress throughout the month of June. The laburnum came in flower on the 8th, and the mulberry in leaf on the 9th, 4 days later than last year; the Búddle*a* globòsa on the 25th, or 9 days later than last year; and the Tradescánt*ia* díscolor on the 26th. The wheat-fly began to appear, in warm sheltered situations, by the 22d; and the temperature falling to 38° in the open air, on the evening of that day, the first crop of these marauders was killed outright. It was prevented from laying its eggs on the wheat-ear, by brisk winds, except on the evenings of the 23d (when they were only a few hours in the fly state), and on the evenings of the 27th, 29th, and 30th: so that the early part of the crop has not been so severely injured as last year. Throughout the whole of July, the air was exceedingly moist; and, till near the end, the temperature was low, the atmosphere cloudy, and rains frequent though seldom heavy: plants, consequently, elongated without maturation. The white single campanula (Campánula *p*ersicifòlia) opened its blossom on the 8th, the same day as last year; and, like last year, it was late in July before hay-cutting could commence, by reason of the rains. Peas that brairded in the field on the 31st of March came in flower on the 12th, a period, from the time of brairding, of 103 days: mean temperature of that period 50·8°. China wheat seeds from Mr. Loudon, sown on the 24th of March, brairded on the 10th of April, and came in the ear in the open ground on the 12th of July, a period, from the time of brairding, of 93 days: mean temperature of that period 51°. The *H*órdeum nùdum seeds, also from Mr. Loudon last year, that brairded in the field at the same time with common barley, came in the ear also at the same time on the 16th; a period, from the time of brairding (p. 392.), of 101 days: mean temperature of that period 51·5°. Oats which brairded on the 24th of April, came in the ear on the 24th; a period, from the time of brairding, of 91 days: mean temperature of that period 52·9°. Last year, oats came in the ear in 74 days, in the same park, from the time of brairding; but the temperature was 1·5° higher, and the moisture in the soil less copious, during the early stage of the plant's growth. The wheat A'phis appeared to join the Cecidomỳia trítici in completing the ruin of the Carse farmer on the 28th and 29th: a thunder storm, with a heavy fall of rain, swept them off on the evening of the 30th, and left the maggots, and their black foes the ichneumons, in quiet possession of the ear. During these two days, the ears in many fields were literally covered with the brown-coloured A'phis: they now lie dead on the surface of the ground, except on awned or bearded wheat, where they have been in some measure protected from the inclemency of the weather. — *A. G. Aug.* 2.

Art. VII. *Instructions for the Collection of Geological Specimens.*

(Copy of a Paper issued by the Geological Society.)

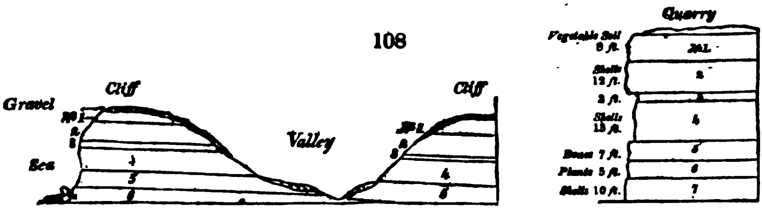
1. The Geological Society begs to impress upon the minds of all collectors, that the chief objects of their research should be specimens of all those rocks, marls, or clays, which contain shells, plants, or any sort of petrifaction.

2. The petrifactions should, if possible, be kept united with portions of the rock, sand, or clay, in which they are found; it being more desirable that the mass should be examined carefully when brought to England, than that any separation of the shells should be attempted at the time of their collection. This injunction, however, does not apply to those cases in which the shells fall readily from their surrounding matrix; but, in this event, great care must be taken of the petrifactions, by rolling them in paper, or some soft material.

3. If several varieties of stone are seen in the same cliff or quarry, and

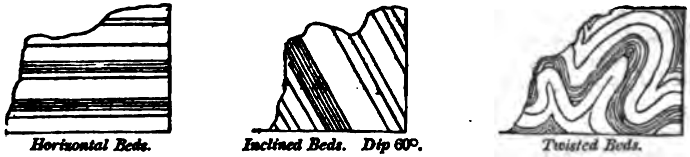
particularly if they contain any petrifactions, specimens of each should be taken, and numbered according to their order of succession; marking the uppermost No. 1., and thence descending with Nos. 2, 3, &c., making as correct an estimate as time will permit, of the thickness of the beds. None of these specimens need be more than 3 in. square, and one and a half or two thick. (*fig.* 108.)

108



4. If the rocks are stratified, that is, divided into beds, state whether they are horizontal, inclined, or twisted. If inclined, observe pretty nearly at what angle, and to what point of the compass they dip; if twisted, a sketch, however slight, is desirable. — N. B. The true dip can seldom be ascertained without examining the beds on more sides than one. (*fig.* 109.)

109

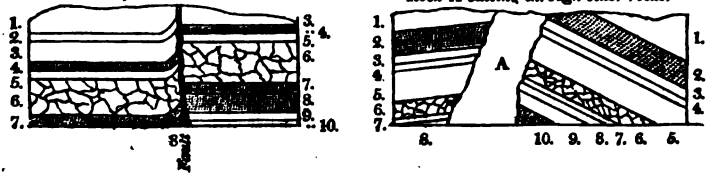


Horizontal Beds. *Inclined Beds. Dip 60°.* *Twisted Beds.*

5. One kind of rock is occasionally seen to cross and cut through the beds of another. In such a case, observe whether the beds are in the same plane on each side of the intruding rock; if not, mark the extent of the disturbance, and also, if there be any difference in the nature of the stone of which the beds are composed, at those points where they touch the intruding rock. Take specimens from the junction, and make a sketch of it. (*fig.* 110.)

110

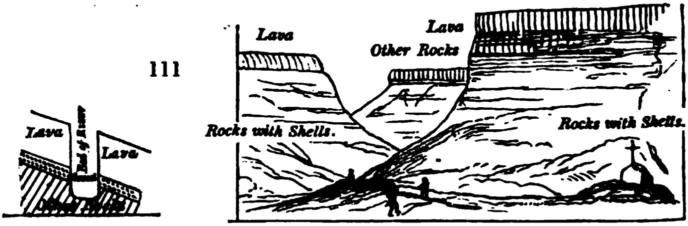
Fault, or Dislocated Beds. *Fault, or Dislocated Beds. Rock A cutting through other rocks.*



6. Where there are wells, get a list of the beds sunk through in digging them; specifying the thickness of each stratum in its order, from the surface downwards.

7. In volcanic districts, procure a list of the volcanoes now or recently in action, and of those which are extinct; stating their position, their distance from the sea or any great lake; the extent, nature, and, if possible, the age, of particular streams of lava, or the relative age of different streams: also, whether the lava currents conform to the valleys, or are seen at different heights above the present rivers; and also if any gravel beds be discoverable beneath the streams of lava. (*fig.* 111.)

111



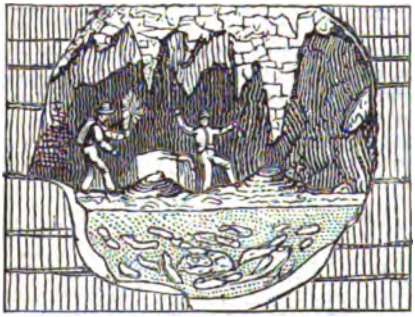
8. Note the names of all places known to contain coal, bitumen, salt, alabaster, metallic ores, or any valuable minerals, specifying their extent, and the nature of the rocks in which they occur; but do not bring away large quantities of iron ore, spar, salt, &c.

9. In cases of coal-pits, specimens of the coal itself and of the beds passed through to obtain it (especially when plants have been found) will be valuable. State whether limestone, iron ore, or springs of bitumen are found near the coal; and if the limestone contains shells, collect abundance of them.

10. Make particular enquiries whether, in digging gravel-pits, or beds of surface clay, mud, and sand, the workmen are in the habit of finding any bones of quadrupeds; and obtain as many of them as possible, selecting particularly teeth and vertebræ.

11. Search also for bones in cracks of rocks, and in caverns. In the latter, the lowest pits or hollows are most likely to contain bones; and if the solid rock be covered with a crust of spar or marl, break through it, and dig out any bones, horns, or pebbles from beneath. (*fig.* 112.)

112



12. Observe if the surface of the country be strewed over with large blocks of stone; remark whether these blocks are angular or rounded, and whether they are of the same or a different nature from the stratum on which they are laid. If the latter, endeavour to trace them to their native bed. Note the different heights at which gravel is found, and whether or not it is composed of the same rocks as the adjoining country.

13. Nautical collectors are requested to separate and preserve any shells or corals which may be brought up, either with the lead or the anchor; noting the depth and the locality.

14. On coasts where there is a considerable ebb tide, and where the shore consists of rocks or clay containing fossils, some of the best of these petrifactions may be looked for, by breaking up with a pick-axe the shelving beds exposed at low water.

15. In making sections, or memorandums, distinguish well upon the coast, between masses which have simply slipped and fallen away, and the real cliff itself.

16. When drift wood is met with at sea, collect pieces of it: note the longitude and latitude, the distance from the nearest land, and the direction of the current by which it has been borne. Examine well the state of the floating mass, and see whether any roots or leaves be attached to it.

17. Every specimen should be labelled on the spot, or as soon after

collection as possible, and then rolled in strong paper, or any soft material, to protect its edges.

18. A heavy hammer to break off the specimens from the rock, and a smaller one to trim them into shape, are indispensable. If the larger hammer have a pick at one end, it will be found very useful in digging up and flaking off those thin shaly beds which usually contain the best preserved shells, &c. A chisel or two are also desirable.

19. The recommendation expressed in the instruction No. 1. may be repeated: — That it should be a general maxim with geological collectors to direct their principal attention to the procuring of fossil organic remains, both animal and vegetable. These are always of value when brought from distant countries, especially when their localities are carefully marked; but when the rocks contain no petrifications, very small specimens are sufficient.

⁂ All boxes to be addressed to W. Lonsdale, Esq. Curator, Geological Society, Somerset House, London.

Apartments of the Geological Society, Somerset House,
London, February 19. 1830.

Art. VIII. *Retrospective Criticism.*

Wilbrand and Ritsen's Picture of Organised Nature. — I object to several incorrect passages in your review of this work. — Vol. II. p. 349. "The lion" lives "only in Africa's burning deserts." This is so far from being the case, that the lion is also found in the comparatively fine climates of Northern India and Southern Africa. — P. 349. "The camels of the Old World belong to the warmer half of the temperate zone." Are they not found in the torrid zone too? From what is said (p. 350.) of the ox and buffalo, the obvious inference is, that the former is peculiar to the temperate zones, and that its place in the torrid zone is supplied by the buffalo; but the ox as well as the buffalo abounds in the torrid zone, and more than one species is found wild in India. "The horse (p. 350.) is" not "found wild in Arabia," neither, I believe, "in Java;" nor is "the bear" (p. 350.) peculiar "to the coldest half of the temperate zone," three species being found in India and its islands. In the same page (350.), "the dog" is said to extend from the "snow to the torrid zone, terminating with the jackall and hyæna;" but the hyæna has been properly separated from the genus *Cānis*, and not only are the jackall and it found in the torrid zone, but the wolf and wild dog also. — P. 350. Again, "the cat genus," "towards the middle of the temperate zone, diminishes into the wild cat." The wild cat, however, the very type of our domestic one, I have often seen in the woods of Southern India. In the same page, the "stork" is oddly enough combined with the "ermine and weasel:" I presume *stoat* is meant. In the same page, again, "moles" are said to "inhabit both the temperate and torrid zones." Is this correct? Again, same page, "porcupines" are not restricted "to the warmest part of the temperate zones:" they are common in the south of India, in the torrid zone. A similar remark applies to the wild swine, which is abundant in most parts of India. "Gulls (p. 351.) are" not "peculiar to the northern hemisphere." I have two different species, which I brought from the Cape of Good Hope; Table Bay is full of them. Is it meant (p. 351.) that frogs are more numerous "in the colder portion of the temperate zone" than in the torrid zone? If so, it is a mistaken idea. As to the lizards being "most numerous in the direction of the snow line," yet "belonging chiefly to the torrid zone," I know not what to make of it. "Crabs and shellfish (p. 352.) are met with in the southern hemisphere beyond 80°"! Who discovered them there? Who ever penetrated beyond 80°? In Vol. II. p. 473. is an extract from the *Medico-Chirurgical Journal* relating to the vulture and "the toucan in India:" now, the toucan is not a native of India, and if the *hornbill* is meant, such, I can say from my own observation, are not its usual habits; I scarcely ever saw it on the ground even, it keeping generally in close shady trees like the cuckoo. Such errors as I have noticed, tacitly sanctioned by being admitted without remark into your valuable magazine, can only serve to mislead or perplex your young zoological readers. — *A Subscriber. January* 26. 1830.

Cuvier's Zoology. — In the first volume of the Magazine of Natural History are some very useful articles, containing an epitome of *Cuvier's System of Zoology*. There is, however, an observation (p. 315.) which requires notice, as being calculated to mislead, namely, that which states that "*iron colours the blood.*" It is true, soon after the discovery of oxygen, chemists and other philosophers stated that the cause of the *red colour* of the blood was a small portion of iron which is found in that vital fluid: but subsequent enquiries have not decided this to be the fact; in truth, the cause of the red colour of the blood appears to be still *sub judice*. It will not be convenient to quote much from recent physiologists to show the truth of this proposition; but it may be necessary and useful to say, that Dr. Ure, under the article *blood*, in his *Chemical Dictionary*, observes: — "No good explanation has yet been given of the change of colour which blood undergoes from exposure to oxygen and other gases;" and Mr. Brande (*Manual of Chemistry*) says: — "The iron appears to be regarded by Berzelius as contributing to the red colour of the blood; a conclusion which my own experiments, detailed in the paper already quoted (*Philosophical Transactions* for 1812), by no means warrant, and which is also at variance with the opinion of M. Vauquelin."

Another is the paragraph (p. 317.) calling, among other conditions of the mind, *memory*, *the association of ideas*, *imagination*, *volition* (what is meant by *volition*?), and *reasoning*, FACULTIES. If the reader will give himself the trouble to refer to what I have said, in my *Lecture on the Mind*, concerning the term *Faculty*, he will soon see, it is presumed, the misapplication of the term Faculty to *states* and *operations* of the mind. I am yours, &c. — *James Jennings. London, January* 28. 1830.

Goître. (p. 191.) — In my *Glance at the Beauties and Sublimities of Switzerland* (p. 161. to 165. inclusive), I have given an opinion on the cause of this singular enlargement of the thyroid gland, which I have investigated on the spot, in the valleys of Switzerland and Savoy. The conclusions which I have been led to form are the results of a careful revision of the facts collected; and I can hardly think that any other opinion can be formed. In *this country* it scarce, comparatively speaking, deserves the name of goître. I have, after the descent of Mount Cenis towards Chambery, witnessed this glandular elongation so monstrous, that it required to be put up in a sack, and cast over the shoulders, not to impede their progress in walking. The hydriodate of potassa mixed up with lard, applied by friction externally as an unguent, has been found very successful in extirpating the goître, even *after it has attained a terrific size*. I analysed almost all the fountains and springs in the canton of the Vallais, and found the water unusually pure in its chemical constituents, and free from extraneous matter mechanically suspended. A gentleman lately arrived from India has communicated some facts to me analogically confirmatory of my views on this curious and important subject. The water of the Hoogly branch of the Ganges exhibits a more reduced temperature, compared with that of the atmosphere, than is found in the Poonah branch of that river. In the former case, also, the ground is low, and presents a humid level, while in the latter it is mountainous, and swept by constant currents of air. In the Hoogly the Brahmins are accustomed to remain several hours during their ablutions, and in the recitations of their prayers, and their lower extremities swell to the thickness almost of the human trunk, while no such circumstance takes place in the Poonah. The peculiar character of idiotism which I have met with in some parts of Wales bears a striking resemblance to the *cretinism* of Switzerland and Savoy. Yours, &c. — *J. Murray. Carmarthen, April* 2. 1830.

Mermaid. — I examined the "thing of shreds and patches" exhibited some years ago as a "mermaid" in the metropolis (p. 188.), and could distinctly perceive the *junction* of the compound, for it was certainly sewed together. I concluded it to be the upper part of the long-armed ape attached to the tail portion of a fish from the Ganges allied to the genus *Sálmo*. The creature seemed to have been put to some cruel death to produce a horrid caricature of humanity. It was constructed in utter defiance of the laws of gravitation, and would have been in the condition of the man who ventured into the water with cork boots. Moreover, it would have required two distinct species of circulation, for a *warm*-blooded animal could never coalesce with a *cold*-blooded one. — *J. Murray. Carmarthen, April* 2. 1830.

Hard Substances in the Stomach of the Alligator. — J. R. (Vol. I. p. 372.) observes, "It is well known that many species of birds swallow small stones, for the purpose, as is supposed, of aiding digestion; but it is, I believe, an anomaly amongst other *other orders of animals*." This assertion is by no means correct, as will be seen from the following extract from a most interesting article on the natural history of the alligator, published in Jameson's *Philosophical Journal*, by my talented friend, Mr. Audubon of Louisiana: — "In those that I have killed, and, I assure you, I have killed a great many, if opened, to see the contents of the stomach, or take fresh fish out of them, I regularly have found round masses of a hard substance, resembling petrified wood. These masses appeared to be useful to the animal in the process of digestion, like those found in the craws of some species of birds. I have broken some of them with a hammer, and found them brittle, and as hard as *stones, which they resemble outwardly also very much*." (*Jameson's Journal*, No. iv. p. 280.) Speaking of the extreme gentleness of alligators during the summer and autumn months, the same eloquent and observant naturalist remarks: — "At this period of the year, to sit or ride on one would not be more difficult than for a child to mount his wooden rocking-horse." This statement fully corroborates the curious account given by Waterton, in his amusing *Wanderings in South America*. — *Perceval Hunter. May* 6. 1829.

The Song of Birds not innate, but acquired. — Sir, Your correspondent J. S., Thurgarton (p. 145.), seems to imagine that the song of birds is not acquired, but innate: by which, I suppose, he must believe that a young bird, bred up from the nest, and never allowed to hear any one of its own species sing, will still sing its natural song. If he supposes this, he is quite mistaken, as he may readily be convinced of, by noticing blackbirds or thrushes in a town or city, where they have not heard any wild ones sing. Their song will be found quite different under such circumstances, and sometimes even their voice disagreeable, particularly to such as have been used to hear them in their natural state. They have no variety in their note, and the greater part of their song is what they have picked up from people whistling to them, or the creaking of a cart or wheelbarrow, or some other discordant noise. I have never found any bird whatever that was bred from the nest, or caught very young, that sang its proper note, except it was placed where it could hear the wild ones sing, and then it will frequently learn the song of some other bird. I had a nightingale that was caught when young, and had never heard a wild one sing: this I kept for three years, and it only sang two or three notes. I then turned it out with a female that I had kept six years. They remained about the neighbourhood until the time of their migration in autumn; in spring they returned, or, at any rate, the male, for it sang in the front of my habitation all the first months of summer. I recognised it immediately on its arrival by its imperfect song, which it had not improved in the least: it had a nest, and reared its young just by; but whether the female was the same that I set off with it, I could not ascertain, as I had no mark to recognise her by. This, I think, proves that nightingales might be colonised in any situation where there were none before, by turning a pair or two of old ones out in spring, which would, without doubt, breed, if in a favourable situation, and their young would most probably return there the following season. This is certainly far preferable to hatching their eggs under other birds, though I do not know that it would make much difference in their song, as they would most probably mix with others of their own species, in the countries they visit in winter, where I suspect they sing the whole of the time, after they leave this country, as they frequently do in a cage all the winter, if kept in a warm situation, and supplied with food that they are partial to. I had one began singing the first of last December, and continued in full song all the month, as loud and fine as if in the month of May. Another bird that I bred from the nest, Saxícola Rubètra, or whinchat, turned out to be one of the finest singing birds I ever heard; but it had scarcely any thing of its natural song, but all acquired, mocking every bird that it heard sing, and imitating their voices as well as notes. Amongst them it had the amazingly loud song of the missel thrush, which sang in Sir H. Wilson's park, near the house where I then resided, during the winter and spring, nearly all day long (this will be an answer to J. B. on the song of the missel thrush. The whinchat sang this song so loud and exact, that we could not bear it in the room when singing; it also sang the notes of all the other birds that were with it in the cages so exactly that they could not be distinguished apart. The following are the birds it imitated: — the larger whitethroat, the willow-wren, redstart, nightingale, and wheatear. I have at present some blackcaps that were bred up from their nest, which, having frequently heard wild ones sing, sing their proper notes; but, besides this, they sing the notes of many other birds. The redstart they imitate so exactly that they cannot be distinguished; also the thrush, which they hear sing in the gardens: they have part of the song of the nightingale and whitethroat, and also the exact call of the canary bird and siskin (or aberdevine), and will learn the song of any bird in a very short time. I think this will show that the song of birds is not innate, but acquired; for even in a wild state some birds of the same species have a much greater variety of notes than others, and are much better songsters; and many birds, particularly the blackcap, will imitate several other birds, even in a wild state. I am, &c. — *R. Sweet. Pomona Place, March* 29. 1830.

The Kingfisher; in reply to J. R. (Vol. II. p. 457.) — Sir, Very pressing engagements, and a severe and long illness, have prevented my noticing the observations of your correspondent J. R., relative to the habits of the kingfisher. We are certainly much obliged to J. R. for the facts concerning that bird which are there stated; but why my statements concerning it are to be questioned, because J. R. has found a solitary exception, I am at a loss to comprehend. As to the Ravensbourne itself, I am, I presume, much better acquainted with the banks of that river than J. R., having resided for many years at Ladywell, Lewisham, and been on its banks at every hour of the day, from four o'clock in the morning till after sunset; and from Deptford all the way up to beyond Rushy Green. *I have never once seen a kingfisher;* and I did therefore mention in my work (*Ornithològia*) the circumstance of a kingfisher being seen between Bromley and Beckenham: and I do still consider the fact as rare; as much so as that related by J. R. In regard to my still more extensive acquaintance with the birds of Somersetshire, I can say that I never have seen the kingfisher near the habitations of man in that county; and I am therefore not disposed, on one solitary fact, to alter my statement concerning that bird in *Ornithològia.* It is, as far as I am acquainted with it, a very shy bird. If any additional confirmation were wanted of the scarcity of this bird in the neighbourhood of the Ravensbourne, I might mention, that to him who delights in a very pleasant walk on the banks of the canal, from New Cross, through Forest Hill Wood, to Sydenham, and thence to Penge Wood, a rich treat is offered, particularly in the spring; when the nightingale and a numerous *et cætera* will gratify his taste; but although here again I have rambled at all hours of the day, early and late and at noon, I never saw one solitary kingfisher, although the canal is not deficient in fish. Will these statements satisfy J. R., as they confirm mine, in my "little work;" a work, however, permit me to say, that, had it been printed in a larger type, would have made a decent *quarto?* — *James Jennings.* 14. *Goswell Road, January* 20. 1830.

Claw of the Fern Owl. — I would beg leave to suggest to Mr. Dillon (p. 31.) that the singular claw of the fern owl is formed for the purpose of detaching the sharp hooked claws of the beetles or chafers which are occasionally affixed to the sides of the mouth, and must impede the bird's swallowing them. — *J. Hayward. February* 11. 1830.

Powers of Smell ascribed to the Vulture. — Sir, As it has repeatedly been remarked, in the annals of science, that the most splendid discoveries and most ingenious inventions have been attributed to wrong individuals, I take the liberty of humbly observing, that the extracts inserted in the tenth Number of your admirable Journal, relative to the power of smell so generally ascribed to the vulture tribe, are not original. To your talented correspondent, Mr. Audubon of Louisiana, whose Shakspearean notes on the Fálco Washingtoniàna have already made him known to so many of your readers, is due the honour of having first exposed the fallacy of those views, in an interesting treatise, in the third number of *Jameson's Journal,* entitled, "An Account of the habits of the Turkey Buzzard, *Vúltur Aúra Lin.*, with the view of exploding the opinion generally entertained of its extraordinary power of smelling;" on an attentive perusal of which, no one, in my humble opinion, can for a moment hesitate in crediting his assertion, that the vulture is not, and never was, in the enjoyment of any extraordinary olfactory power. — *Perceval Hunter. Walthamstow, March* 19.

A Female Sparrowhawk with a blue Back. — Sir, In the Magazine of Natural History (Vol. I. p. 220.), your correspondent T. F. says he has never seen a female sparrowhawk with a blue back, like the adult male: I have seen two the last year (1829); one shot in October, the other in November, by myself, in the act of pursuing a wounded fieldfare, and it is now in my possession stuffed. — *F. B. Kingsbury, February,* 1830.

The Snipe's Beak. — Sir, I observe your correspondent, S. T. P. (p. 29.), speaks of the snipe's beak as being formed for boring. I know the notion is very generally entertained that the woodcock and the snipe obtain their food by boring for it in soft earth; but this, I think, is mere conjecture, and not well founded. If these birds obtained their food in this manner, their bills must necessarily carry the marks of the mud, at the depth to which the bill has penetrated, and this I never could find. But being desirous of ascertaining the fact, I once took an opportunity of watching six or seven snipes at the foot of a little rill of water, in a meadow, during a hard frost, for fifteen or twenty minutes, through a glass, and they appeared to watch for their food, like the heron, and to take it by dashing their bills very quick into the water, which they also drew back again with great quickness, shifting their ground a little, occasionally. No doubt their food consists chiefly of animalcula, which they see moving in the water or on the wet surface. I once also had two young woodcocks, not half grown, which were caught by a cow-boy on a hill, where there was no water, and not only where the earth was dry and hard, but their bills were evidently too soft and tender to be thrust into the earth. — *J. Hayward. Feb.* 11. 1830.

The Cuckoo and the Cuckoo's Maid. — Sir, Your correspondent X. Y. (p. 160.), speaking of the abundance of cuckoos in the neighbourhood of the Malvern Hills, observes, that "the workmen in the neighbourhood say a bird comes with them, which they call the *cuckoo's maid;* but I never saw it." The species alluded to, I have no doubt, is the wryneck (*Yúnx* Torquílla), which comes and is heard about the same time as the cuckoo, or usually a little before that bird, and is commonly known in this neighbourhood by the name of *cuckoo's mate.* Possibly X. Y. may have mistaken the word "mate" for "maid," owing to the provincial pronunciation of his informers; or the bird may really be called "cuckoo's maid" in that quarter, from the notion of its being the usual attendant, the *handmaid* as it were, of the cuckoo. I recollect once, in the spring, asking an intelligent labourer, much in the habit of observing birds, whether he had yet heard the cuckoo? "No, Sir," he replied, "but I dare say we soon shall, for I have heard his mate."

While on the subject of the cuckoo, I may be allowed, perhaps, to ask (and I do it respectfully, without meaning to give offence,) whether Mr. White of Bedford can be correct in stating (p. 154.) that "the cuckoo continued to charm us with his twofold note till the 28th of July?" The bird is commonly silent three weeks or more before that date; and if, in this instance, he continued his song till the 28th of July, it is certainly a very unusual circumstance.

Departure of the Swift. The same naturalist, too, I cannot help thinking, must be under a mistake where he states (p. 154.) that "the house marten and the swift took their departure on October 27." The latest date at which I ever could see the swift was September 15., two or three individuals only, at the sea-coast, near Penzance, evidently in the act of migrating, as the main body of them had disappeared long before. Mr. White's notice seems to imply, not that a stray swift was left till October 27. (which yet would be a very remarkable instance), but that the general flight remained till that time, which appears to me hardly credible. Some apology, I am aware, is due from me to Mr. White, for having ventured to call in question the correctness of his information. Truth and accuracy, however, I conceive to be the object with us both. Having long been a close observer of these interesting birds, and finding them, for the most part, pretty uniform in their motions, I cannot help hesitating to give implicit credence to statements so very much at variance with what usually takes place. Had the swifts presented themselves to my notice at the end of October, I assure you I should have looked at them again and again, before I could have been persuaded to believe my own eyes. It is not impossible that some typographical error respecting the date may have crept into the text of your Magazine, in which case it would be desirable to correct it in a future Number. — *W. T. Bree. Allesley Rectory, March* 29.

Snakes taking the Water. — In reference to your Portsmouth correspondent, it may be remarked, that I believe it not a *rare* phenomenon to find snakes or vipers occasionally take the water, either to cross a stream or traverse a pond or lake. A curious instance was communicated to me of *an adder* having seized the artificial fly of an individual when fishing in one of the lakes of Scotland, on the verge of the estuary of a river. It was finally drowned, by dragging it into the current against the stream. — *J. Murray. Carmarthen, April* 2. 1830.

Skate Spawn. — The "Fairy Purses" found in abundance along the sea shore, and alluded to in p. 157., are well known to be the ovaria of the skate; but it is very rare to find an imperforated specimen; they are generally rent, and the young animal has made its escape. I have in my collection two beautiful specimens from the Indian Seas: both contain the perfect "animal" within, and distinctly perceptible through the envelope. I selected them from a great many: all the rest were empty cases: the threads proceeding from the angles form beautiful curled tassels. — *J. Murray. Carmarthen, April* 2. 1830.

Búccinum lapíllus.—Sir, Your correspondent G. J., on Molluscous Animals (p. 44.), says that the *B*úccinum lapíllus, is "exposed for sale in large quantities in the fish-shops of the metropolis." He is certainly mistaken in the species: the only species of the whelk tribe sold in London, as an article of food, are the *B.* undàtum, and the *M*ùrex antìquus *Lin.* It may lead young beginners into an error. The least observation will show how different the species are; the *B.* lapíllus not being one fifth the size of the other two. I am no draughtsman, or I would send you a sketch of the three. — *A Constant Reader. Stepney, Jan.* 28. 1830.

Conway Pearl Fishery. — Two very different kinds of pearl are collected about the Conway: one kind, the produce of a fresh-water muscle, *M*ỳa margaritífera, called by the Welsh, Cregin y dylw (shells of the flood), or perhaps Cregin y deuliw (shells of two colours); from which very valuable pearls are *sometimes* obtained, not much inferior to the Oriental ones. I have seen a very beautiful pearl from a lake in Scotland half an inch in diameter, and of a perfectly hemispherical shape. They are taken in the upper part of the Conway, near Llanrwst, but the search is very precarious. The other kind is abundantly obtained from the common edible muscle, *M*ýtilus edùlis, in the mouth of the river Conway, and in the Menai near Bangor. When the tide is out, numbers of people may be seen, of all ages, gathering the shells from the rocks and stones to which they are attached. The pearls yielded by these shells, though numerous, are small, irregularly formed, and of a bad colour. It is these pearls that are sent to London, and the destination of which is so mysterious. — *W. Wilson. Warrington, June,* 1830.

Pearls in the Conway. (p. 130.) — I suppose the misshapen so-called pearls sent to you must have been obtained, not from the *M*ỳa margaritífera (U'nio elongàta of Lamarck), but from the common muscle (*M*ýtilus edùlis) in which minute and misshapen and ill-coloured concretions are often found. My late brother found a very fine pearl in the common muscle: it was of a perfect form and considerable size, that of an *ordinary pea:* it was unfortunately however of a purplish tint, and wanted all the rich brilliancy which so distinguishes the Oriental pearls. Though pearls are found in the shells of various Testàcea, as the common oyster, *M*ýtilus edùlis, *P*ínna, Haliòtis, &c., I believe the *M*ýtilus margaritífera and *M*ỳa margaritífera are those alone which yield the best supply as to colour, number, quality, size, and form. That *rara avis* the "pink pearl" is found in one of the conchs. I have seen small Oriental pearls of a perfect form, yet in great variety of colours, in Earl Mountnorris's collection; and even when obtained from the "pearl oyster" (muscle) as it is commonly called, the forms are sometimes fantastic enough. I have a very fine one, large; a complete biceps, resembling a double-headed shot; it is Oriental, and of the finest brilliancy, but useless as an article for jewellery. The pearl fisheries of the Conway, and especially of Scotland, were once considerable, and charters were granted for their monopoly. I have been informed that a lady on the Conway nets nearly a thousand a year by the pearls of that river, *under a charter:* doubtless these must be obtained from the *M*ỳa margaritífera (the pearl muscle does not exist in the Conway), if this is actually the case, for it is probable I may have been misinformed. Poor persons pick out useless pearls, such as do not deserve the name of that beautiful concretion, the ornament of coronets and crowns, and vend them for a trifle. It is, however, some years now since I was on the Conway, and the delightful science of conchology formed then no part of my studies.

I think it demonstrable that the pearl is not the product of disease; an animal excretion, but moulded from the pearly matter of the shell; the cavities in the interior of the shell, and where the pearls are found to lodge, seem to go far to prove this. The vast size and great variety of form and colour occasionally presented concur in the conjectural probability. They are formed by the animal as plugs to stop up the *enemies' mine*, — the circular, &c., perforations of the Vènus lithóphagus, *M*ýtilus lithóphagus, Phòlas dáctylus, and *M*ùrex *Brandàris*, &c. — *J. Murray. Carmarthen, April* 2. 1830.

Leather Coat Jack (Vol. III. p. 80). — Sir, The following extract from Kirby and Spence's *Entomology*, vol. iv. p. 189., will throw some light upon the history of this wonder-working individual, who appears to have been, by a feat almost as extraordinary, transformed by Mr. Rhind into an insect. "But the grub of Elóphilus tènax (a drone-looking fly) affords a more surprising instance of this power of counteraction: — an inhabitant of muddy pools, it has occasionally been taken up with the water used in paper-making, and, strange to say, according to Linné, has resisted without injury the immense pressure given to the surrounding pulp (*Fn. Suec.* 1799); like Leather Coat Jack, mentioned by Mr. Bell (*Anatomy of Expression in Painting*, 170.), who, from a similar force of muscle, could suffer carriages to drive over him without receiving any injury." The circumstance mentioned by Linnæus is however more wonderful than the exploits of the above individual; and the authority of the learned Swede is of so high a nature, that but little doubt can arise upon the narrative. — *J. O. Westwood. Feb.* 7. 1830.

I*chneumónidæ*. — Sir, It is a constant source of regret to the real lover of nature, that the more minute objects of the creation are generally looked upon by the professed general naturalist with apathy, even if they are not entirely disregarded, as though they were unworthy of attention and investigation. Forgetful that the lowest insect or polype, even the meanest atom that lives, the Mònas itself, derives importance from occupying a link in the great and complicated chain of the creation, such persons are contented to observe and study objects only which attract their attention by their splendour or size, or by the benefits or injuries which they discover them to be capable of bestowing or inflicting. It is not however to be denied that many, nay, the majority, of the more minute creatures exhibit "the work of an almighty hand" in a far more wonderful and interesting manner than their larger brethren, whether we regard the brilliancy of their colouring, the peculiarity of their characters, or the exceeding singularity of their economy. Hence, from such inattention must obviously arise great confusion in the nomenclature of the objects; and it has hence repeatedly occurred, that the most interesting observations have become lost to the student, from the circumstance of the object being either unnamed or misnamed. Of this confusion existing in the greatest degree, the minute families of hymenopterous insects have perhaps afforded the most prevalent examples. And I cannot but regret that the communication of your correspondent T. H. (p. 51.) has exhibited an additional proof of this confusion in his nomenclature of the object of his paper, namely, a very small species of ichneumon fly (*I*chneùmon ovulòrum of Linnæus, Platygáster ovulòrum of the fam. Proctotrùpidæ of Latreille. In the first place, it is to be observed, that the *name* of the insect adopted by your correspondent, *I.* ovulòrum, is sufficient of itself, from its reference to the economy of the species, to prove that it could not be applicable to the insect in question; the true *I.* ovulòrum of Linnæus inhabiting, as the name implies, *the eggs* of lepidopterous insects. Your correspondent's insect is in fact the *I*chneùmon glomeràtus of Linnæus, and its history has been investigated by Reaumur, De Geer, Rösel, &c. &c. In the second place, supposing that your correspondent's insect were the true *I*chneùmon ovulòrum, or that he were correct in referring the egg-feeding ichneumon to the genus

Platygáster * amongst the Proctotrùpidæ of Latreille, it is singular that the characters of the latter family should have been completely overlooked in considering them to be capable of including your correspondent's insect, the characters of which, as will be seen below, completely disagree with those of the Proctotrùpidæ. I have therefore thought that it might prove serviceable to subjoin the two following tables of the characters, &c., of the four very distinct families, *I*chneumónidæ, Cynípidæ, Chalcídidæ, and Proctotrùpidæ, which have, nevertheless, in a greater or less degree, been hitherto confused with each other, and of which families many hundred species are inhabitants of this country.

These tables, you will perceive, are not drawn up in that strictly scientific and technical form which, I am convinced, retards rather than promotes the increase of knowledge; neither are they intended to comprise or reject all those modifications in structure which the terminal objects in any group exhibit. The first is deduced from the manners and economy, and the second from the structure of the parts, of such of the insects as may be considered as the types of the different groups.

TABLE 1.

Herbivorous, forming galls upon various plants		CYNI′PIDÆ.
Parasites, feeding either within or upon the surface of eggs, larvæ, or pupæ, of other insects		
Pupa naked		CHALCI′DIDÆ.
Pupa enclosed in a cocoon	I am not aware of any material difference between the *habits* of these two families	PROCTOTRU‵PIDÆ (minute). *I*CHNEUMO′NIDÆ (typical species large).

TABLE 2.

Antennæ, not elbowed (i. e. with the basal joint short), and not thickened at the tips:	
Composed of more than 20 joints; *ovipositor* with three straight fillets; *wings* with numerous nerves	*I*CHNEUMO′NIDÆ.
Composed of not more than 15 joints; *ovipositor* spiral, concealed in the abdomen; *under wings* with only one nervure	CYNI′PIDÆ.
Antennæ, elbowed (with the basal joint long), and with the tips generally thickened:	
Under wings nerveless; *upper wings* nerveless, or with a few nerves; *antennæ* 12 to 15 jointed; *palpi* long; *ovipositor* tubular; *colours* sombre	PROCTOTRU‵PIDÆ.
Under wings with one nerve; *upper wings* with one nerve descending into the centre of the wing from the middle of the front margin; *antennæ* with not more than 12 joints; *palpi* short; *ovipositor* composed of three straight fillets, generally concealed in the abdomen; *colours* splendid	CHALCI′DIDÆ.

J. Westwood. Feb. 7. 1830.

Leptùra, Criocéridæ. — Sir, The communication of your correspondent

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* I observe that Mr. Stephens has done this in his Catalogue, but I am not aware upon what published authority. I however think the reference to be correct.

E. S. (p. 148. fig. 30. a b) tends, I regret to say, from the additional initial affixed to his signature, to show that there still remain some disciples of that school, who, although they deem it an honourable mark of distinction to rank themselves as members of that society which bears the name, and which ought also to adopt the principles, of the great Linnæus, yet apparently consider that the labours of that great master were, unlike those of other men, susceptible of no further improvement; and who consequently overlook not only the labours of men almost equal in rank with himself, but also the very principles which guided him throughout his bright career, and which would doubtless have induced him to adopt, if not absolutely to propose, those very alterations and improvements in science which his would-be-considered disciples refuse to countenance and employ, if they do not actually laugh at and deride, but which more accurate investigation and by far greater numbers of the objects of such investigation have proved to be well-founded and correct. I need not, in this place, attempt to show the differences of structure which exist between the insects composing the family called Criocéridæ, to one of the genera of which, Donàcia, the subject of your correspondent's observations actually belongs; and the family Leptùridæ, in the typical or chief genus of which, Leptùra, your correspondent has placed the insect alluded to, doubtless because Linnæus himself regarded those species with which he was acquainted as belonging thereto. It is sufficient for my present purpose to point out the circumstance, that this difference in structure is borne out by difference in habits, inasmuch as the true Leptùræ do not form silken cells, but undergo a naked transformation; whereas the Donàciæ, as E. S. himself informs us, construct cells for purposes which it may not be uninteresting to enquire into, more especially as E. S. has left the question, whether they are the production of the larva or perfect insect, in doubt, and also in consequence of the circumstance described by E. S. involving the interesting enquiry of the hybernation of insects.

Cases of the nature of those described by E. S. may be fabricated either by the perfect insect or by the larva. If by the former, they may be considered as constructed either for the purpose of a general habitation, or merely for the purpose of hybernation. But it appears to me very evident that it was for neither of these purposes that these cases were formed. Indeed, in respect to habitations formed by the perfect insect, for the purposes of a general and constant, or even an occasional, habitation, Messrs. Kirby and Spence (*Introduction*, vol. i. p. 473.) remark, in treating upon this subject, "From the next division of the habitations of insects — those formed by solitary perfect insects for their own accommodation — I shall select for description only two, both the work of spiders, which, indeed, with the exception of the inartificial retreats made by the *Achètæ*, *Cicindèlæ*, and perhaps a few others, are the only ones properly belonging to it." With regard also to the formation of habitations by the perfect insect for the purpose of hybernation, the same authors (vol. ii. p. 440.) observe that "it does not appear that any perfect insect has the faculty of fabricating for itself a winter abode similar to those formed of silk, &c., by some larvæ. Schmid, indeed, has mentioned finding *Rhàgium* mórdax and inquisitor *F.* in such abodes, constructed, as he thought, of the inner bark of trees; but these, as Illiger has suggested, were more probably the deserted dwellings of lepidopterous larvæ, of which the beetles in question had taken possession." One of the circumstances mentioned by E. S. must also be considered as sufficient in itself to prove that the perfect insect was not the architect of the cases in question, since it cannot be supposed that an insect living above the surface of the water, and constantly on the wing, would select a spot for its abode under water.

It only remains therefore to regard these cases as the production of the larvæ: and here the researches of the same interesting authors will at once clear up the doubt, since we are informed by them, (vol. iii. p. 214.) that amongst the larvæ (although chiefly of the lepidopterous tribes) which enclose themselves in silken cocoons, are " those brilliant beetles frequenting aquatic plants constituting the genus Donàcia F.; and in a subsequent page (227.), when speaking of the situation, often very remote from their place of feeding, in which larvæ fabricate their cocoons, they state, that that of Donàcia fasciàta is fastened by one side to the roots or surculi of *Tỳpha* latifòlia."

It does not appear to me improbable that E. S. was led to conclude that the cocoons in question were the fabrication of the perfect insect, in consequence of his having found the perfect insect enclosed. He has, however, omitted to state the precise time when he discovered them, which would in some degree determine the question, although we may conclude that it was some time during the winter. A circumstance, however, which I observed last October, induces me to consider that the insect attains its perfect state in the beginning of the winter, and remains enclosed in its cocoon until revived by the warmth of the following spring; indeed, Kirby and Spence confirm this supposition by observing (vol. iii. p. 293. n. *c.*) that " insects of the beetle tribe, especially such as undergo their metamorphosis under ground, in the trunks of trees, &c., are often a considerable time after quitting the puparium before their organs acquire the requisite hardness to enable them to make their way to the surface."

The following are the particulars of the circumstance above alluded to; and several interesting enquiries arise upon it, which it is not my present intention to enter upon. During the month of October, I have repeatedly found upon the leaves of the oak a circular gall, when full grown about the size of a boy's marble, on opening which I invariably discovered its interior to have been but very little eaten by the larva, the centre only being occupied by a small circular cell about one sixth of an inch in diameter. In some galls this cell contained a full-sized grub ready to transform to the pupa, whilst in others that transformation had already taken place. In the majority of instances, however, the cell contained a perfect gall fly, Cỳnips quércus-fòlii *; and Reaumur, who does not notice the circumstance above mentioned of the discovery of the larva and pupa, has given the following observations upon this insect: — " Quand la feuille tombe au commencement de l'hiver, la galle tombe nécessairement avec elle. J'en ai ramassé de celles qui étoient tombées, et je les ai ouvertes dans le mois de Décembre; j'ai vu alors que le centre de chacune avoit une cavité bien sphérique, qui étoit le logement d'une mouche qui s'étoit tirée de sa dépouille de nymphe, mais qui attendoit que la rude saison fût passée pour sortir d'une cellule bien close et en état de la defendre par l'épaisseur de ses parois contre les injures de l'air." † — *Mémoires*, &c., vol. iii. mém. 12. p. 226. edit. 12mo, and plate 39. f. 13—16. Rosel has also given most beautiful illustrations of this insect in all its stages, in his *Der Monatlich*, &c. vol. iii. pl. 52, 53.

It only remains for me to notice the concluding interesting observation of E. S. relative to the formation of the cocoon *under water* without the water entering into it during the progress of its formation. Is E. S. certain that the situation in which the cocoon was found was under water at the time of its fabrication? If such were not the case, it is necessary, in order to ascertain the true mode employed in the formation, to bear in mind the habitation of the larva; upon which point Latreille, in his *Histoire Naturelle*, &c., vol. ii. p. 324., states that the species of Donàcia are generally found " sur l'iris et le roseau; ce qui fait croire que leurs larves, qui ne sont pas connues, vivent dans la tige de ces plantes. Selon Linnæus, la nymphe de la Donacie crassipède, qui a la forme d'une coque brune, est fixée sur la racine de la Phellandrie." * And Kirby and Spence (vol. iv. p. 500.) more decidedly state that " on aquatic plants you must look for Helòdes, and the splendid Donàciæ, which, living on submerged shoots and roots of these plants in their larva state, continue to attend them when perfect."

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* Some of the flies appeared to me to be endeavouring to cut their way out of the galls.

† " In the month of December I opened some galls which had fallen with the leaves at the commencement of winter, and in the centre of each I found a spherical cavity tenanted by a fly, already escaped from its puparium, and only awaiting the departure of the cold season to emerge from a cell well closed, and sufficient, from the thickness of its walls, to defend the inhabitant from the inclemency of the atmosphere."

The question is one of considerable interest, involving as it does the method in which other aquatic insects, such as the Dytícidæ, Hydrophílidæ, &c., construct their cocoons, as well also as the method in which the cases of the grubs of the caddice flies (Trichóptera) are formed. I have not however at present an opportunity of referring to the observations of De Geer, Reaumur, &c., upon these points. I remain, Sir, &c. — *John O. Westwood. Chelsea, March* 22. 1830.

P. S. I find that the Cÿnips quércus-fòlii occasionally remains in the larva or pupa state through the winter, my friend Mr. Ingpen having discovered some of the galls upon leaves lying upon the ground, so late as the 28th ult., each of which, when opened, contained a single pupa. — *J. O. W. April* 3. 1830.

The Ascent of aëronautic Spiders in the Atmosphere.—Mr. Murray states that "a spider's thread, darted through the air, must necessarily acquire electricity from the friction occasioned by its impulse through that medium; and, if propelled *counter* to a current, the amount of excitement will be greater." What would take place under such circumstances, Mr. Murray may amuse himself with supposing, if he pleases; but, how stands the fact? Why, I have clearly proved, by direct experiments, given in detail, — experiments requiring no *delicate manipulation*, which I have invited, and again do invite, Mr. Murray to repeat, that spiders are utterly incapable of darting their lines *even through the space of half an inch*. These animals, though placed on excellent conductors of electricity, such as *metallic rods* insulated by water, if exposed to a current of air, let out their lines with facility, and *invariably in the direction of the breeze*. The act is perfectly voluntary; and the lines, immediately after they are emitted, nay, at the very time they are issuing from the spinning-apparatus, if blown upon from any other quarter, instantly obey the new impulse thus imparted to them. I have tried this experiment many hundred times, without once perceiving the slightest deviation from these results, which I therefore regard as completely established. To suppose, in direct opposition to the most conclusive evidence to the contrary, that spiders, not larger than the head of a small pin, can dart out lines, so fine as to be absolutely invisible, except in a powerful light, to a distance of 10 or 20 ft., through a resisting medium like the atmosphere, implies no ordinary share of mental obliquity; but to insist, as Mr. Murray does, that they can propel them in a right line, *against a stream of air*, is in the highest degree unphilosophical. My opponent, anxious to induce an exalted opinion of his merits as an experimentalist by affecting to despise those of others, insinuates that I am ignorant of phenomena familiar to almost every tyro in electricity, and falls into the absurdity of putting as queries what, in the same paragraph, he assumes to be unquestionable. As for his electrical experiments made on spiders and their lines, I again affirm that I have repeated the greater part of them, with all the exactness of which they are susceptible, without having succeeded in establishing their validity in a single instance.

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* " Upon the iris and the reed; which renders it probable that their larvæ, which are unknown, live in the stems of these plants. According to Linnæus, the chrysalis of the thick-footed Donàcia, which resembles a brown shell, is fixed upon the roots of *Phellándrium*.

With a degree of inconsistency almost unparalleled, Mr. Murray expresses his contempt for authorities at the very time he is appealing to others in support of his own statements. Now, surely the observations of a Humboldt are as deserving of confidence as the attestations of Mr. Murray's anonymous friends can be.

That I am not the only individual whose attempts to confirm the accuracy of Mr. Murray's experiments on spiders have proved ineffectual, will be seen from the following passage, transcribed from a work entitled *Insect Architecture,* published under the superintendence of the Society for the Diffusion of Useful Knowledge. The author, after giving an abstract of Mr. Murray's investigations (part ii. p. 345–6.), adds, " Such is the chief evidence in support of the electrical theory; but, though we have tried these experiments, we have not succeeded in verifying any one of them." This extract, certainly, is not adapted to remove Mr. Murray's prejudice against authorities; I am persuaded, however, that it will not be deemed unimportant by impartial enquirers.

I proceed to notice Mr. Murray's remarks upon the " *dark brown glossy gossamer spider,*" which, with his usual want of precision, he terms a *variety.* After asserting the correctness of his former observations on the speedy dissolution of this species in a state of confinement, he recommends a repetition of the experiment, but is evidently reluctant that I should investigate the matter further. Thus Mr. Murray not only declines to try my experiments, but would gladly preclude me from examining his. Could this have been anticipated from one whose professed object is the *promotion of truth?* Any comment would be superfluous. The results of my researches on this subject may be found in my letter of the 19th of July, 1829 (Vol. II. p. 397–8.), and subsequent experiments confirm their accuracy.

Mortified that he cannot controvert the evidence advanced in support of my doctrines, Mr. Murray is mean enough to intimate that I maintain opinions which I know to be false. I can make every suitable allowance for the irritation of a vanquished adversary, but so glaring a delinquency as this is quite inexcusable.

In retiring from this needlessly protracted contest, my antagonist condescends to assure me, that if I can satisfactorily confute the facts and phenomena recorded in his *Experimental Researches in Natural History,* he shall give me credit for more wit than he supposed I possessed. To correct the numerous errors contained in that publication would be a practicable though laborious undertaking: but who, beside Mr. Murray, ever thought of confuting *facts and phenomena?* If his good opinion is to be obtained on this condition only, there remains no alternative for me but to endeavour to console myself without it. I am, Sir, &c. — *John Blackwall. Crumpsall Hall, March* 8. 1830.

The Ascent of the Spider. — Notwithstanding what Mr. Rennie says, in his very delightful book on insect architecture, Bowman and Murray are certainly right. It is by electric influence that they ascend. It was on the apex of the gnomon of my sundial here that I saw these gentlemen separately make their experiments. They wish me, as does D——, to strike a blow in your Magazine; but I abhor controversy, and this spider one seems to have banished courtesy. — *J. F. M. May* 30. 1830. ⊙

Flight of Spiders. — I feel indebted to Mr. Thompson, of Hull, for the record of this phenomenon. (p. 47.) I notice it here as a singular coincidence with what I had myself observed on the 28th of July last, in a hayfield near Hull, and published in my *Treatise on Atmospherical Electricity.*

"Three aeronautic spiders ascended *from the same spot*, when each moved in a different direction," &c. (p. 81.) Now, that no collusion may be suspected in the case, it may suffice to mention, I have not the honour to know Mr. Thompson personally, and have had no communication whatever with him; nor is it likely he had seen my work on aerial electricity. This was published in December last, and Mr. Thompson's communication has, for the first time, appeared in the present Number (Jan.). How long it has been in your possession I know not, but of its existence I at any rate was ignorant. It is palpably evident that in the one case the projectile thread was independent of a current of air. The naturalist of Selbourne declares the same thing, and he was a keen and cautious observer; and it seems also clear that in both the floatage owned another cause than the ascent of calorific emanations. I have, however, other facts, which I shall elsewhere adduce, and that I believe will set the matter to rest. — *J. Murray. Carmarthen, April* 2. 1830.

Nidus on a Rush. — Sir, The nidus figured in Vol. II. p. 104. is not, I believe, the work of an aquatic spider, as supposed by your correspondent, and also by our celebrated entomologist, the Rev. W. Kirby (Vol. II. p 405.), nor is it so uncommon as it is considered by that indefatigable and successful collector, Captain Blomer. (Vol. II. p. 303.) I have found it on high stalks of grass in shallow road-side drains, which are dry in summer and at other times when water does not abound: this shows that it is not the nest of an aquatic spider. I have to mention another circumstance respecting it, which seems to have escaped the notice of others, and which will account for its supposed rarity. This snow-white silken fabric is concealed by a covering of mud soon after it is spun. Several years ago, when I was on an entomological ramble in the neighbourhood of Stowey, in Somersetshire, I found a few of the nests, just like those figured. On searching further, I met with one partly covered with mud, which led me to the discovery of others thoroughly plastered over. In this state they resembled bits of dirt splashed from the road on the stalks of grass. The plaster was evidently collected by the parent spider from the moist bed of the drain from which the grass grew. I could have collected dozens of the nests in the different states: the plastered ones were the most numerous. I brought home a few, but the young spiders never came out; and I regret that I cannot inform you what species perform this ingenious work, for I consider it as beautiful and interesting as any thing recorded in the history of insect architecture. I have reared young spiders from analogous nests, a sketch of which I send herewith, together with figures of our beautiful nidus in its unplastered and plastered state. (*fig.* 113.) — — *W. B. B. W. February* 20. 1830.

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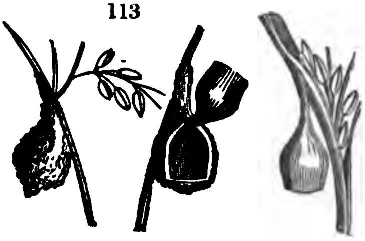

The Hessian Fly. — The insect figured by Mr. Kirby (Vol. I. p. 227.) is evidently one of the Cúlices; but he refers it to the Típula genus. The Típulæ, I believe, are destitute of a trunk, with which the Cúlices are furnished. The resemblance of some of the smaller species of these two genera is so close, that they have been confounded by both Gœdart and Swammerdam. — *A. L. A. Alnwick, April* 7. 1830.

Fly's Eye under the Microscope. —By far the most beautiful phenomenon of this kind is exhibited in the picture of the window reflected from the numerous facets of the compound eye of the Libéllula or dragon fly, and this multiplied image becomes extremely curious, being in motion, when an assistant at the same time raises and lowers the sashes of the window. — *J. Murray. Carmarthen, April* 2. 1830.

Filària. (p. 149.) — During my present pedestrian rambles through South Wales, I accidentally stumbled on a specimen of Leptùra, which had been crushed on the road about two miles from Abergavenny. In this case, my attention was arrested by what seemed to be several coils of a thready matter, not much unlike fine catgut, and protruded from the abdomen. I carefully removed this, and found it to be Filària, more than 3 in. long: it was still alive, and seemed to have threaded itself into a knot (*fig.* 114.) in the body of the insect. The conductor of that very elegant and valuable periodical the *Botanic Garden* may, therefore, be persuaded, with myself, that it will be found more generally an intestinal parasite, in coleopterous insects, than it may be at present believed, and that it is by no means peculiar to the Forfícula. — *J. Murray. Carmarthen, April* 2. 1830.

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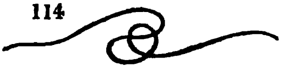

Drying Plants. — Having (Vol. II. p. 245.) recommended the plan of drying plants between papers from an experience of more than twenty years, I deem it my duty to such of your readers as may have put it in practice, to inform them that I have this season tried, with unlooked-for success, the method long since recommended by Mr. Whateley, in the introductory volume of Withering's *Botanical Arrangement*, of drying them in sand. The ultimate result of each, when properly pursued, is nearly similar; but the expedition, the great saving of time and trouble, and the ease with which the requisite pressure is adjusted, give to the process by sand such decided advantages, that I cannot too strongly recommend it. I generally place the sand-boxes in an oven, and heat the sand to about 100° Fahrenheit.* As many of your young readers may not have access to Withering's now superseded volumes, it might be well if you would copy Mr. Whateley's directions into your valuable pages. — *J. E. B. June* 3. 1830.

" Previously to the drying of plants by this plan, it will be necessary to procure the apparatus: — 1. A strong oak box, of the size and shape of those used for the packing up of tin plates. 2. A quantity of fine dry and searced sand of any kind, sufficient to fill the box. 3. A considerable number of pieces of pliant paper, from 1 in. to 4 in. square. 4. Some small flat leaden weights, and a few small bound books.

" The specimen of any plant intended for the herbarium should be carefully collected when dry, and in the height of its flowering, with the different parts as perfect as possible, and in the smaller plants the roots should be taken up. It should then be brought home in a tin-box, well closed from the air. The plant should be cleared from the decayed leaves and dirt, and afterwards laid upon the inside of one of the leaves of a sheet of common cap paper. The upper leaves and flowers should then be covered in an expanded state with pieces † of the prepared paper, which may be placed in any irregular way, and kept down by the fingers till these parts of the plant are entirely covered by them: and after that, let one or two of the leaden weights be placed upon the papers. The parts of the plants below should then be covered with the pieces of paper, and likewise with the weights, and thus the whole plant should be laid in its proper expanded form by the same method. The weights should then be carefully removed, and the other leaf of the sheet of paper applied to its opposite one, having the loose pieces of paper and plants between them. After which one or two of the books should be placed on the outside of the paper, and remain there until as many other plants as are intended to be preserved have been prepared in like manner. A layer of sand, an inch deep, should then be put into the box, and afterwards one of the plants, with the books placed upon it, which last should be removed after a sufficient quantity of sand is put upon the paper, to prevent the plant from varying its form.* All the other plants may then be put into the box in the same manner, with a layer of sand about an inch thick between each, when the sand should be gently pressed down by the foot, and the degree of pressure, in some measure, regulated by the kind of plants in the box. If they are stiff and firm, as the holly or furze, much pressure is required. If tender and succulent, a less degree is better, for fear of extravasating the juices, which would injure the colour of the plant; but particular care should be taken to make a sufficient degree of pressure upon the expanded blossoms of plants, that they may not shrivel in drying. The box should then be carefully placed before a fire, with one side a little raised, or occasionally flat, as may be most convenient, alternately changing the sides of the box to the fire, twice or thrice a day; or, when convenient, it may be put into an oven in a gentle heat. In two or three days the plants will be perfectly dry. The sand should then be taken out with a common plate, and put into a spare box, and the plants carefully taken out also, and removed to a sheet of writing paper." (*Whateley, in Withering's Botany*, vol. i. p. 28.)

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* Twenty-four or thirty-six hours in this temperature generally produces complete desiccation.

" † As the beauty of the specimen depends very much upon this part of the process, each large petal ought to be laid flat, separately, with a piece of paper, and the utmost care taken that every part of the plant be laid down without folds, which may be done, in general, in a short time."

The Practice of Travellers, in disseminating Exotics among our Indigenous Plants. — Sir, I beg to call your attention to the following extract from the valuable and highly interesting new edition of the *Arrangement of British Plants*, in which a practice, worthy surely of severer reprobation, is thus courteously condemned: — Additions and corrections, p. 442. vol. iv. "*A*ntirrhìnum Cymbalària. In reference to the note, add: Since writing the above, we observe an acknowledgment, on the part of a certain enthusiastic naturalist (see *Mag. Nat. Hist.*, Vol. I. p. 400.), of his having sown the plant in question on the rock near Barmouth; a practice from which other similar errors have originated, and concerning which, as tending to create confusion in science, among those especially who would wish to see the stations of our native plants defined with accuracy, there can be but one opinion. E." — Your insertion of this notice may be the means of deterring other travellers from conduct so reprehensible, and will moreover oblige — *A Constant Subscriber. Bristol, May* 29. 1830. [Is not the beautifying of our wild scenery a thousand times more valuable than this exclusive devotion to a single science?] — *Cond.*

Disseminating Exotics, and mistaking them for British Plants. — An impression was formerly too prevalent, that the Flora of the British islands had been so fully investigated, that no new discoveries could be made; and this misconception has been strengthened by the deservedly unsuccessful attempts to introduce mere varieties as species, through the medium of the later editions of Withering's *Botanical Arrangement*. But a new and more auspicious era has now commenced; and while the taste for natural science is daily augmented and diffused by the zeal of its professors in the various universities of the three kingdoms, the recent additions to our British plants in Dr. Hooker's newly published *Flora*, as well as those which had but a short time previously appeared, for the first time, in the *English Flora* of Sir J. E. Smith, are sufficient to show that our own country may still possess

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"* Those of the genus *P*otamogèton, and others of the same kind, ought to be put into the sand without loss of time, and well pressed, otherwise they are apt to dry too fast, and shrivel."

"Full many a flower yet born to blush unseen,
And waste its sweetness on the desert air."

Yet, in our researches, some caution is requisite; for it appears that a race of *disseminators* has arisen, from whose gratuitous labours we are likely to have many *spurious* appendages to our list. (See a late Number of the *Mag. Nat. Hist.*) This practice is not to be recommended, and it is earnestly suggested to the individuals who adopt it (and I particularly address myself to the candid and talented writer alluded to in the Magazine), that if *they* should hereafter discover a new and truly indigenous plant, the circumstance of their having been thus employed will very much weaken, if it does not wholly destroy, the weight of their testimony; for, though full credit for intentional veracity may be due to them, and conceded, it may yet be doubted whether they be not mistaken in their recollection, or purposely deceived by other less honest disseminators. Nor will the inconvenience be entirely removed by a timely avowal of the interpolation, since no botanist can hereafter investigate the districts so contaminated without having the discouraging idea that whatever he sees there, *new or interesting*, has perhaps been officiously conveyed thither by others: and when it is considered how desirable it is that a perfect and authentic catalogue of our indigenous plants should exist in print (and in no former age have such favourable and adequate opportunities been possessed as in the present), surely no true botanist will hereafter lend himself to a practice so replete with mischief. — *W. Wilson. Warrington, June*, 1830.

Apócynum androsæmifòlium. — In mentioning *The Journal of a Naturalist*, a work from which I have derived much instruction and amusement, I regret that there is any part which can afford opportunity for condemnation; but the account (p. 80. 1st edit.) and engraving of that curious plant, the *A*pócynum *a*ndrosæmifòlium (Fly-catching Dog's-bane), is so very incorrect, that I cannot think the author can ever have *seen* a specimen, much less *examined* one. From having frequently examined the plant, I can recommend to the notice of your readers the description of it in p. 280. vol. viii. of Curtis's *Botanical Magazine*, as being very accurate and clear. It is accompanied also with a correct representation of the flower. — *W. C. T. Jan.* 28. 1830.

Errata. — Pelargònium phæ'um (p. 169.), and P. lùcidum and columbìnum (p. 174.), should be *G*eránium p., l., and c.: there is no British species of Pelargònium. — *R. Sweet. Pomona Place, March* 29. 1830.

Erióphorum pubéscens. — At p. 241. of Vol. I. there is a figure of this species, which is altogether erroneous. The stem is perfectly smooth, not being as it is represented; and the rough downiness of the peduncles is scarcely visible without a magnifier, while in the figure they are bristled stronger than a thistle. The reviewer of the *Flora of Berwick* hints a doubt of its distinctness from E. polystàchyon, but the species are totally different both in characters and habit. The figure of the latter in *English Botany* is very good. — *George Johnston. Berwick upon Tweed, March* 17. 1830.

Blue-bells of Scotland. — In the *Flora of Berwick* I have said that the Campánula rotundifòlia is the blue-bell of Scotland, an assertion questioned by my too favourable reviewer (Vol. II. p. 236.), who believes the *S*cílla nùtans to be the flower thus distinguished. I have spent nearly the whole of the days of my life in the extreme north of England, and in the south of Scotland, and until science had made known to me another and a less interesting nomenclature, I knew the Campánula only as the blue-bell of my native land; and a subsequent enquiry has satisfied me that I am correct. These heart-stirring and endearing names, I regret to add, are fast lapsing to oblivion, and, unless the local florist will commemorate them in his pages, our children will read our pastoral poets without knowledge of the objects described. Sir W. Scott, in the passage cited against me,

"E'en the slight *hare-bell* raised its head,
Elastic, from her airy tread,"

is writing, I may remark, in English, and more attentive, probably, to the harmony of his verse than to the local name of his flower. — *George Johnston. Berwick upon Tweed, March* 17.

V*ícia lathyròides.* — In the review of the *Flora of Berwick*, Vol. II. p. 237., it is asserted that *V*ícia *l*athyròides "has hitherto been found only on the sands of the eastern counties;" and, therefore, that our plant is probably either *L.* angustifòlia or some variety of *V.* satìva. The assertion of the reviewer is at variance with the testimony of the best authorities. Sir J. E. Smith appears to have found *V. l*athyròides in the King's Park at Edinburgh (*Eng. Fl.*, iii. p. 223.), where it was originally detected by Dr. Parsons. Dr. Greville, we infer, has gathered it in the same station (*Fl. Edin.*, p. 157.); and Hooker, and Borrer, and Arnott, botanists of the very first rank, have each of them found it in Scotland. (*Hook. Fl. Scot.*, p. 215.) From Smith's account we must, I think, consider the character drawn from the seeds as the most important and discriminative, and in the specimens which we examined for the purpose of ascertaining the species, the seeds were very plainly *square and granulated.* In other respects our plant very closely resembles small varieties of *V.* satìva, from which it is, however, readily distinguished by its small, inconspicuous, bluish-purple flowers; a character not perhaps of much consequence, but which may call the attention of the young botanist to it. In all the wild varieties of *V.* satìva the flowers are large, reddish purple, and very pretty; not merely evident to the practised eye, but showing bravely among the short thick herbage in which they delight to grow. — *Id.*

Shining Moss. — Sir, My remarks on this singularly brilliant vegetable, in your Magazine for September last (Vol. II. p. 407.), being made from imperfect specimens, and under some degree of uncertainty whether the figure I gave was that of the true luminous object, it may be satisfactory to state, that a recent examination of fresh specimens, made under more favourable circumstances, and with a compound microscope, on the spot, has enabled me to speak with certainty, both as to its form and the cause of its extraordinary brilliancy. This is the more necessary, as a correspondent in your Number for March last (p. 152.) has suggested whether the light might not proceed from minute plants of Dícranum *t*axifòlium. I have no doubt that "the phosphorescent brilliancy" he describes is the same I have observed in Derbyshire; but it certainly could not proceed from this common moss, as its leaves are not reticulated. Has he not mistaken for it the more rare Gymnóstomum osmundà*ceum* (Schistóstega pennàta *Hooker*), which I have found accompanying the shining moss in several neighbouring stations in Derbyshire?

The drawing which accompanied my former remarks is undoubtedly that of the true plant; but, being made from dried specimens subsequently moistened, the articulations of the fronds and innotations have too much of an oval or oblong shape. When examined fresh, they appear, under the microscope, perfectly globular, like so many minute beads threaded over every part of the plant, or like particles of spherical pollen linearly arranged into the form it bears, and their size is precisely that of the seeds of Gymnóstomum pyrifórme, which I had under the microscope at the same time. The innotations are occasionally cylindrical, without articulations, near the summit, such being, perhaps, in an early unformed state. The base, or central part of the plant, adheres horizontally to the loose sand, and consists of a flat layer of closely congregated globules, from the outer edges of which issue the sprig-like divaricating branches. The central frondose mass of spherules escaped my observation last year in the dried specimens; but the annexed sketches (*fig.* 115.), taken with the microscope from fresh plants, show their perfect form: *a*, an entire plant, highly magnified; *b*, a detached portion; *c*, a separate branch, more highly magnified.

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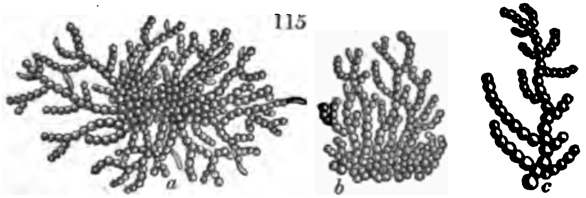

From many repeated observations, I am satisfied as to the correctness of the explanation I ventured to give of the cause of the splendid appearance of this minute vegetable. Indeed, a person acquainted with the laws of optics, as exhibited in lenses, would, on examining its structure of innumerable perfect globules filled with a highly pellucid green fluid, have pronounced, *à priori*, that they would condense the rays of light, and appear luminous to an eye placed in the angle of incidence, and the fact that it is always most brilliant, either in the cave or in a room with only a single window, when the face is turned *from* the light, *illustrates* the theory in a singular manner.

I have no hesitation in referring this beautiful moss to the order *Algæ*, of which it will probably be found to belong to the tribe Confervöideæ; but I must leave it to those who are better acquainted with this obscure family to decide whether it has yet obtained a name and a place in the system of modern cryptogamic botanists. — *J. E. Bowman. The Court, near Wrexham, June* 3. 1830.

Geological Errors. — In p. 67. you give, in fig. 15., a sketch to show the relative position of the secondary rocks, which is taken from one of Dr. Buckland's sections given in the fourth volume of the *Transactions of the Geological Society*, to illustrate his description of the groups of slate and greenstone rocks, which occur in Cumberland and Westmoreland, at the base of the great escarpment of Crossfell. The error has probably arisen from confounding the two colours used to show the "whin sill" in the midst of the mountain limestone beds, and the belt of greenstone rocks which accompany the slates and porphyries, through nearly their whole course; perhaps, also, some confusion may have occurred from the term "trap" being used in the description on the plate; but, from whatever source it arises, an attention to the description in the text would clearly have explained Dr. Buckland's meaning. In your Magazine, the greenstone is designated "trap or whin sill;" from which it might naturally be inferred, that it was a portion of the whin sill which is found in the escarpment above, more especially as there are beds of mountain limestone, sandstone, and coal reposing upon it. This would be a great error, as it has no relation to that bed, but is merely, as Dr. Buckland describes it, a greenstone, whose varieties, from the different proportions of its ingredients, are almost endless. Having twice had an opportunity of examining this singular group of rocks in the course of my observations on the "whin sill," I cannot refrain from offering my humble tribute of praise to Dr. Buckland, for the clear and accurate description he has given of them. I would, besides, take the present opportunity of saying a few words upon the old red sandstone, which occurs here, well defined, although of inconsiderable thickness.* The error into which Forster fell, in his section of the strata, by confounding the old red conglomerate with the new red sandstone formation of the vale of the Eden, and supposing the latter to underlie the mountain lime stone, has been long exploded; nevertheless some excellent geologists have very recently again confounded the two formations, by considering the conglomerate, as it displays itself upon Melmerby Fell, as the lower member of the new red sandstone, analogous to the well-known Exeter conglomerate. This error has arisen from the peculiar nature of the ground, and from a too confined examination of the stratum. On Melmerby Fell the whole face of the escarpment is thrown into disorder by great land-slips which have taken place, so that, in rising upwards, we would appear to arrive at several beds of the same rock. Thus in endeavouring to reach the great or Melmerby Scar limestone, which here forms so important a feature, after toiling up a steep ascent, we arrive at what appears to be the regular basset of the stratum, but, when upon it, find, that it is only a fragment slipped from the bed, which may be seen at a great height above. This is precisely the cause of the confusion in the old red sandstone: it is here raised considerably above its usual level, by the greater protrusion of the slate rocks; and, in ascending the Fell by Melmerby Beck, it makes its appearance several times, so that its true relation to the adjoining strata is very difficult to define. By tracing the foot of the escarpment southward, it may be seen in many places undisturbed, but perhaps can no where be studied to greater advantage than in Blencarn Burn, between Melmerby and Knock. Here it is found at the base of the cliff regularly reposing upon the clay slate rocks, and having resting upon it the alternating beds of the mountain limestone formation. If we examine this group of slate and greenstone rocks, and the beds associated with it, according to the views recently propounded in France by M. Elie de Beaumont, it would appear that the range of Crossfell had been raised after the consolidation of the coal measures, and before the deposition of the new red sandstone. The beds of mountain limestone and coal strata, thrown into a position almost vertical by the rising of the slate and greenstone rocks, prove the first proposition, and the undisturbed state of the new red sandstone, which, like a sea, sweeps round and fills up the inequalities of the older strata, being thus brought into contact with rocks of all ages, would appear to prove the second. — *William Hutton. Newcastle upon Tyne, April* 8. 1830.

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* It is a singular thing, that Smith, in his geological maps of Cumberland and Westmoreland, does not notice the old red sandstone of the foot of Crossfell.

Dr. Ure's Geology; in answer to T. E. (p. 90.) — Sir, I am most anxious that your valuable pages be not unnecessarily occupied by controversy: my notice of the observations of T. E. of Cambridge shall therefore be as brief as possible. The blunders of Dr. Ure in placing the lias above the coral rag, &c., and which, in my ignorance, I deemed an important error, your Cambridge correspondent says ought only to be considered as "a gross oversight in the correction of the press!" Be it so. Some, perhaps, will think T. E.'s expression as severe as mine. But can T. E. be serious when he asserts that Dr. Ure is actually right in his account of the strata and fossils of the Hastings beds? Can it be correct to state, in one part of the volume, that those deposits are probably of marine origin, and that their organic remains are *Naútili*, Ammon*ites*, &c. (*Dr. Ure*, p. 274.); and in another part to mention that herbivorous reptiles, terrestrial vegetables, &c., are found in the same beds, and quote as authority an author (*Dr. Ure*, p. 453.) who maintains that neither *Naútili*, nor Ammon*ites*, nor any of the other ancient multilocular genera of Testàcea, occur in them? I might, indeed, Sir, refer to the Number of your Journal (p. 12.) in which T. E.'s letter appears, in support of the objections advanced in my former communication: Mr. Bakewell's remarks render mine unnecessary. The attempt of T. E. to defend the accuracy of the plates is so manifest a failure as scarcely to require refutation. Scaphites, *Coneybeare*, p. 73. "The first genus (Ammon*ites*) occurs rarely in the upper chalk; the second (Scaphites) *only in the lower*." If this be an error, it is Messrs. Coneybeare and

Phillips's, not mine. *Mya* intermèdia, "in the London clay, Bognor rocks." *Sowerby, Min. Conch.*, vol. i. p. 173. If this be incorrect, the mistake is Mr. Sowerby's. T. E. next ventures upon the most extraordinary assertion, that pl. iv., designated, by Dr. Ure, "shells of the cornbrash and upper oolite," is intended to include the fossils from the *chalk marl* to the cornbrash! Alas! Sir, this excuse will avail nothing, unless every reader had the ingenuity of T. E., and could discover the author's intentions in spite of his blunders. It happens, too, most unfortunately, that the well-known tertiary shells Rostellària macróptera (not Protellària, as your printer had it by mistake) and Turritélla conöídea are in the group; so that a still further stretch of the imagination is requisite to reconcile the discrepancy, and the reader must take pl. iv., not as the author has named it, but as exhibiting figures of the "shells of the cornbrash and upper oolites," and tertiary formations inclusive! T. E. asks for my authority: I again quote Sowerby, *Min. Conch.*, vol. i. p. 109., for Turritélla conöídea; and the same work, vol. iii. p. 177., for Rostellària macróptera. Your excellent correspondent, the author of the admirable work alluded to, can correct me if my inferences are erroneous. But I feel, Sir, I may have ventured too far: a Cambridge man, who has an opportunity of attending the lectures of Professor Sedgewick, must be right, and the authorities upon which my remarks are founded may be wrong, or, what is more probable, have been misunderstood by me. It may, after all, be not an important error to invert the order of superposition of the strata; it may be right to declare that a formation is marine, and contains marine shells, &c., and group it with a series of marine deposits, and afterwards describe the fresh-water and terrestrial remains with which it abounds. It may be unimportant to figure, as the characteristic shells of one group of strata, shells that occur only in another. But if it be so, it must be allowed that geology is still, what it was formerly asserted to be, a science of paradoxes. — *H. January* 28. 1830.

Dr. Ure's Geology. (p. 90.) — Having admitted more than one apology for this work, we think it necessary to give the following statement respecting it from Professor Sedgewick's Address delivered to the Geological Society at their Annual General Meeting on Feb. 19. 1830.: —

"I should have been well content to have ended with these general censures; but during the past year there has been sent forth, by one of our own body, 'A New System of Geology, in which the great revolutions of the earth and of animated nature are reconciled at once to modern science and to sacred history;' and to this title I will venture to add, in which the worst violations of philosophic rule, by the daring union of things incongruous, have been adopted by the author from others, and at the same time decorated by new fantasies of his own. I shall not stop to combat the bold and unauthorised hypothesis, that all the successive formations of the old schistose rocks were called into being simultaneously, by a fiat of Creative Power, anterior to the existence of creatures possessing life; nor shall I urge that, among these primitive creations of the author, are mountain masses of rock formed by mechanical degradation from rocks which preceded, and beds of organic remains, placed there, if we may believe his system, in mere mockery of our senses; neither shall I detain you by dwelling upon the errors and contradictions which are scattered through the early pages of his volume. On this part of the 'New System' all criticism is uncalled for here; for it soars far above us and our lowly contemplations. Its character is written, and its very physiognomy appears, in that dignified and oracular censure which he himself has quoted from the works of Bacon: 'Tanto magis hæc vanitas inhibenda venit et coercenda, quia ex divinorum et humanorum male-sana admixtione, non solum educitur philosophia phantastica, sed etiam religio hæretica.'—'This vanity merits castigation and reproof; the more as, from the mischievous admixture of divine and human things, there is compounded at once a fantastical philosophy and a heretical religion.'

"All these things, gentlemen, I shall pass over: but the author has stood forward as the popular expositor of the present state of secondary; of that very portion of our science which has for so many years employed the best efforts of our Society. This part of the work appears not to contain one original fact, or the result of one original investigation; and of this we do not complain. We have, however, a right to look to it for information, which shall not repeat exploded errors, but shall make a near approach to the level of recent observations. But is this the case in the work before us? Unquestionably not. All the old errors in the arrangement of the English strata, between the chalk and the oolites, are unaccountably repeated; errors which have been corrected since 1824 in our *Transactions*, in English and Scotch philosophical journals, and in various independent works of natural history, and have excited, during the last five or six years, more discussions in this room than have arisen out of any other part of secondary geology. Other antiquated errors, of like kind, have found a place of refuge in the pages of this 'New System.'

"But let us pass over what may be, perhaps, only regarded as errors of omission, and see how the author has employed the materials before him. The best part of his narrative is made up of successive extracts, often taken word for word, yet without the marks of quotation, from various well-known works on geology. Many of these extracts, although in themselves admirable, appear in the book before us but as disjointed fragments, in the arrangement of which the author has but ill performed the humble duties of a compiler; for, in the chapter on secondary formations, we find enormous faults and dislocations, of which there is neither any written record, nor any archetype in the book of nature. Thus we find the lias sometimes below the oolites and the green sand. * In one page, the cornbrash and forest marble have shifted places; in another the whole lower oolite system is absolutely inverted. † Again, at p. 247., we are told that the several beds are given, 'as usual, in the ascending order;' yet, in this very page the inferior members of the lower oolites are copied, word for word, from another book, and are in the descending order. On the next leaf, the same error is repeated in a still worse form; and within four pages of this last *bouleversement*, we find the Oxford clay, the corn-brash, and the forest marble twice shuffled under the great oolite. ‡ The goodly pile, gentlemen, which many of you have helped to rear, after years of labour, has been pulled down and reconstructed, but with such unskilful hands that its inscriptions are turned upside down; its sculptured figures have their heads to the ground, and their heels to the heavens; and the whole fabric, amid the fantastic ornaments by which it is degraded, has lost all the beauty and the harmony of its old proportions.

"So much has been written in illustration of the zoological history of our several formations, that the labour of a compiler is now made comparatively easy. Yet, in the distribution of organic remains, given in the 'New System,' there is such a complication of errors as nearly baffles all attempts at description. In one place we are told that the lower secondary rocks are characterised by the simplest forms of the animal kingdom: in another, we find fish enumerated among the fossils of the transition (or submedial) strata. § In one place, our magnesian limestone is properly identified with the first flötz limestone of Werner: in another, our moun-

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"* New System of Geology. Compare p. 133. 153. with p. 137. 197.

"† Ibid., p. 187. 195.

"‡ Ibid., p. 253.

"§ Compare Introduction, p. xlix. and p. 143.

tain limestone is placed on the same parallel, and, by a double blunder, is described 'as the lowest sepulchre of vertebrated animals.'[*]

"In one page, orthoceratites are brought near the order of corals; in another, a coral is figured as an encrinite; in a third, the Steeple-Ashton caryophyllia (the characteristic fossil of the middle oolite) is figured as a fossil of the inferior system; in a fourth, a caryophyllia of the mountain limestone is figured among the organic remains of the cornbrash; and, lastly, the celebrated lily encrinite (a characteristic fossil of the muschelkalk, a formation unknown in England,) is introduced and figured among the fossils of the lower oolitic system.[†]

"Errors like these are, above every thing, calculated to mislead men who are unpractised in geology; and they do not terminate here. But I have no right to detain you with a longer enumeration.[‡] I have stated

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"[*] New System, p. 175. 177. 187.

"[†] Ibid., p. 149. 176. 251. 256, 257.

"[‡] For the purpose of illustrating the organic remains of the successive mineral strata, there are, at the end of the 'New System,' five plates, representing groups of fossils, with their generic and specific names. Had the figures been well selected, they might have been of great use; as it is, they can only be the means of disseminating error.

"Plate I. professes to represent the 'Shells of the Mountain Limestone.' Of its thirteen figures, three or four are well chosen; none of the rest ought to have appeared. One of them is wrong named; and a recent nerita, with all its fresh markings, has unaccountably found its place among these old fossils.

"Plate II. 'Shells of the Lias.' In this plate, of twelve species, we are astonished to find a transition orthoceratite, the Prodúctus scóticus of the mountain limestone, and a scaphite of the green sand, placed side by side with the Gryphæ'a incúrva, Plagióstoma gìgas, and some other true lias fossils!

"Plate III. 'Shells of the Under Oolite.' Thirteen species; and a more uncharacteristic assemblage was, perhaps, never before brought together. A tertiary mya and a nummulite have here found their way, for the first time, among the shells of the under oolite. Two or three of the other species ought to have appeared, if at all, in the next plate.

"Plate IV. 'Shells of the Cornbrash and Upper Oolites.' Here the confusion is still greater; for, of twelve species, seven are positively misplaced, the others are ill selected, and one of them is wrong named. The mineral conchologist is confounded at the sight of the well-known turrilites and hamites of the green sand group, of the turritellæ and superb Rostellària macróptera of the London clay, jostled in among the fossils of the oolites. Had the author drawn out by lot, from all the fossils in Mr. Sowerby's work, the species which were to decorate this plate, chance might have given him a more illustrative series.

"Plate V. 'Shells of the Chalk and superior Strata.' Among the nineteen figures of this plate, no attempt is made to separate the shells of the chalk from those of the over-lying tertiary deposits, although the two groups have not, perhaps, one species in common. In Plate I. two freshwater shells were introduced, which were not characteristic: here freshwater shells are characteristic, but are omitted altogether; and the *Pécten* quinquecostàtus is the characteristic fossil of the green sand.

"One who was even moderately acquainted with the characteristic forms of organic remains could never have been led into such a complication of errors; and they are the more discreditable, as the greater part of them might have been avoided by the mere exercise of the humblest duty of a compiler."

enough to prove, that, in the conduct of this work, the author has shown neither the information nor the industry which might justify him in becoming an interpreter of the labours of others, or the framer of a system of his own." (*Phil. Mag.*, April, 1830, p. 313.)

The Description of the Double Shadows noticed by me, and inserted in your Magazine (Vol. II. p. 108.), having been misunderstood by your correspondent W., I transmit to you the subjoined drawing (*fig.* 116.), and beg to state that, in no one instance, have there been any pools of water in the street that could reflect the sun's image when the double shadows have been observed. The carriage way in this town is a macadamised road, kept in the best order possible. The arguments of W. would have been perfectly correct, had there been any collection of water in the road, and had the appearance of the shadows been such as represented in his diagram. In the present case, I think some other cause must be assigned. I am, Sir, &c. — *Muphatamet. Wycombe, Jan.* 16. 1830.

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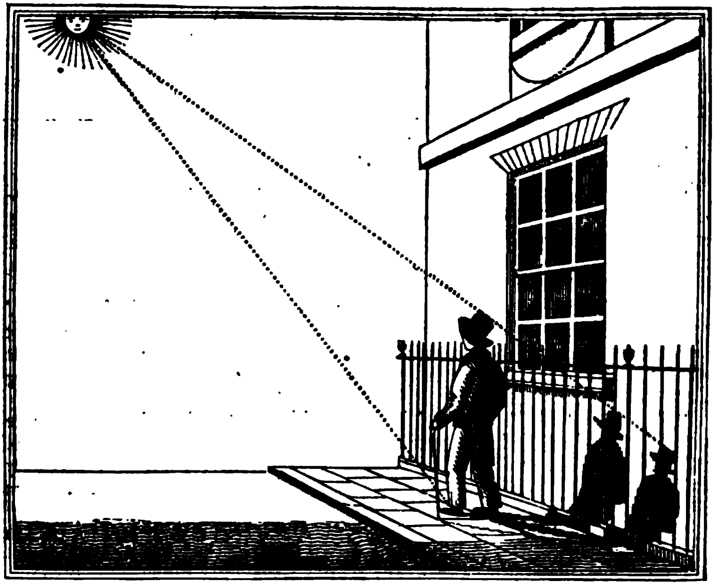

Errata. — In p. 244. line 30. for "fig. 57." read "fig. 58." In p. 247. line 25. for "*Papílio* cratægàta" read "*Papílio* cratæ`gi." In p. 372. line 19. after "*Quadrumanous*" insert the words "and *Bimanous*."

ART. IX. *Queries and Answers.*

A MONTHLY Guide for Young Naturalists. — Sir, Will you be so good as to inform me if there is a work in circulation, of portable size, and moderate price, which directs the naturalist in his monthly researches, and may be referred to as a guide for every season? Such a volume would be of incalculable service to the young beginner, who often finds himself at a loss to know when to commence his search, and what to look to for. Information on this subject will oblige, yours, &c. — *H. March* 29. 1830.

Forster's *Perennial Calendar*, 1 vol. 8vo, or Forster's *Pocket Encyclopædia of Natural Phenomena*, 12mo, will supply the wants of our correspondent to a certain extent. — *Cond.*

Parochial Natural History. — Sir, If you would trouble yourself to draw up a list of questions to be proposed to the readers of your Magazine of Natural History, with a view of obtaining, from their answers, something of the natural history of the respective parishes in which they reside, you could not fail of accumulating much useful and interesting matter, and such as might afterwards be applied to very valuable purposes.

A list of queries to this effect was inserted in the *Gentleman's Magazine* for 1755, what success I know not. I have a small 12mo pamphlet, published at Edinburgh, entitled *A Description of the Parish of Melrose*, which appears to have been drawn up in answer to them; but it relates entirely to the history and antiquities of the place.

The taste for natural history is so much increased since the year 1775, that answers to well selected questions on the subject may be obtained with much greater facility now than they could have been at that time. The following are a few of the queries proposed in the *Gentleman's Magazine*: —

"What is the appearance of the country in the parish, is it flat, or hilly, rocky or mountainous? Do the lands consist of woods, arable, pasture, meadow, heath, or what? Are they fenny or moorish, boggy or firm? Is there sand, clay, chalk, stone, gravel, loam, or what is the nature of the soil? Are there any lakes, meers, or waters; what are they; their depth; where do they rise, and whither do they run? Are there any subterraneous rivers, which appear in one place, then sink into the earth, and rise again? Are there any mineral springs, what are they, at what seasons of the year are they reckoned best, and what distempers are they frequented for? Are there any periodical springs which rise and fall, ebb and flow; at what seasons? Are there any and what mines? Any marble, moorstone, or other stone of any sort? What are the chief products of the lands; wheat, barley, &c. &c.? What sort of fish do the rivers produce, what quantities, and in what seasons are they best? Are there any remarkable caves or grottoes? On digging wells, or other openings, what strata of soil do they meet with, and how thick is each? How low do the springs lie? Does the parish produce any quantities of timber, of what sort? What is the nature of the air? Any petrifying springs? Any hot wells? Are there any figured stones, such as echinites, belemnites, &c.? Any having the impression of plants or fishes on them, or any fossil marine bodies, such as shell, corals, &c., or any petrified parts of animals? Is any part of the parish subject to inundations or land floods? If the parish is on the sea coast, what sort of shore, flat, sandy, high, or rocky? What sorts of fish are caught? What other sea animals, plants, sponges, corals, shells, &c. are found on the coasts? Are there any remarkable sea weeds? What are the courses of the tide on the shore, or off at sea; the currents at a mile's distance; and other things worthy of remark?"

Many of these queries might be expunged, and others substituted, but they cannot be too particular or minute; and there are a great many subjects of interest which are not at all touched upon; these you would frame new questions for, entirely divesting them of all technicalities.

I do but throw out the hint to you, as being a matter particularly deserving your consideration: if you think it worth attending to, I shall be most happy to give you such information as lies within my power. Yours, &c. — *G. M. Lynn Regis, March* 9. 1830.

A pamphlet by the Rev. Edward Stanley, F.L.S., entitled *Statistical*

Questions, includes also questions on every department of natural history. When we can spare room, we intend to select these, and print them in this Magazine, as a stimulus to readers of leisure in the country. In the mean time, as the pamphlet costs only a shilling, we recommend it to be procured. — *Cond.*

Various Queries. — Can you or any of your correspondents inform me which is the best method to keep snails and slugs in confinement, with a view to studying their natural habits? Which is the best elementary treatise on comparative anatomy? Have any of your readers ever seen a living specimen of the great Irish greyhound, the Cànis gràius hibérnicus of Ray; and, if so, can they inform me where it is to be seen? It is mentioned by Buffon and Pennant as "very scarce;" and it is not noticed in Fleming's *British Animals*. The breed is at present most probably extinct. Can you or any of your correspondents give me any information respecting the habits of that curious compound of bird and beast, the Ornithorýnchus? — *Perceval Hunter. Walthamstow, March* 19. 1830.

Natural History Depôt, and Native Ornithology. — Sir, In the Number of your Magazine for March, I observe some valuable hints relative to the establishment of a depôt for objects of natural history, by which persons forming collections in different parts of the British Isles (but who, by professional business or otherwise, are compelled to reside in one place) might be enabled to procure specimens in exchange. In so desirable a scheme I cordially concur, and trust that ere long some zealous person may step forward, and set on foot an undertaking of such general utility.

Until, however, something of the kind shall be established, I am desirous of knowing if there is any gentleman forming a native ornithological collection, who has duplicates he would wish to exchange, and if he could furnish me with a list of them, and also of those specimens which he wishes to have. It is well known that some parts of our islands are much more frequented by different species of birds than others; and that in one district a bird may be considered rare, which in another is common. By interchanges of specimens both parties are benefited, and by establishing such a correspondence, hints and observations are reciprocally communicated, which may tend materially to advance so delightful a study as that of ornithology. — *Jas. Drummond Marshall. Belfast, May* 25. 1830.

The best Work on Zoology. — Sir, I should be glad to know, which is the best work on zoology, especially on the Mammàlia and A'ves, to be found in the English language? Can Cuvier's *Animal Kingdom*, edited by Griffith, be depended upon, as exhibiting a comprehensive and correct view of the two above-mentioned departments? Are the plates in that work generally considered faithful delineations of the animals which they are intended to represent? A reply to these questions in your next Number will greatly oblige — *A Zoological Student. Bangor, Caernarvonshire, June* 1. 1830.

Taking it altogether, we should consider Griffith's *Cuvier* as the best work in the *English* language; but we prefer the *French* original. Griffith has overlaid Cuvier, and produced much too bulky and dear a book. — *Cond.*

The Cause of Goître. — The remarks of Mr. Aaron, on the cause of goître, that drinking snow water does not cause it, are certainly correct. At Santipur, in Bengal, goître is very prevalent among the Mahommedan population, and is, I believe, confined to them; the Hindoos, drinking only the water of the Ganges, while the Mahommedans sink wells within their *compounds*, and drink the water, which rises through a bed of sand; a chemical analysis of the well water at Santipur might possibly throw some light on the subject. Many of the Mahommedans are occupied in embroidering muslins, and sit with the head lowered down, looking on their work. Can such employment affect the muscles, and cause enlargement? — *An Old Bengally. April* 15. 1830.

Gold on the Teeth of Sheep. — Sir, In Vol. II. p. 467., I observe a note on the opinion among the peasantry of Scotland, that gold may be discovered by examining the teeth of sheep feeding on pastures where it is subjacent. I think that in one of the Roman poets there is a passage to the same effect. I have part of the jaw of a sheep, in which the teeth are coated with iron pyrites, looking like silver. This explains the origin of the above-mentioned opinions; the coating of silver, or gold-like pyrites, being probably derived from the water or soil of the pastures where the sheep have fed. — *W. C. T.* *Jan.* 28. 1830.

The Water-Shrew. — Sir, Having seen in your valuable work, two interesting accounts of the water-shrew, one by Mr. Dovaston (Vol. II. p. 219.), and the other by W. L. (p. 236.), I beg leave to inform you, that in a mouse-trap baited with cheese, in our cellar, within four or five miles of this town, two were taken, male and female, together with several other animals which are not generally found in houses, principally the long-tailed field mouse and common shrew; during a severe frost, in the month of January, 1825, when all the water in the neighbourhood was frozen over. The pit, from which I rather suppose they came (having since seen one there), which is not above three or four hundred yards from the house, is very shallow, and must have been almost one complete sheet of ice, except in the deepest parts; and as the animal does not appear to go far from the edge, I should apprehend it could not reach the water at all, and was therefore driven from its usual haunts to seek food in places very dissimilar to its nature. The male was taken about a week before the female: his colour was a glossy black above, silvery beneath, and the throat of a deep chestnut colour, which in the female was greyish. His length was 6 in. He did not appear at all alarmed, but would not eat any thing, though I observed him every now and then gnawing into pieces some grass and hay which were put into his cage. He did not appear to swallow any part of them, but was continually drinking of, and dabbling in, some water which was placed for him. He died suddenly, without showing any symptoms of illness, the third day after his capture, and apparently as plump as when he was taken. The female was caught one evening in the following week, and though great care was taken in removing her into another box, so as to prevent any injury, she was found dead the following morning, I suppose from agitation, as the traps were so constructed that they could not possibly have hurt either of them: her length was a quarter of an inch less than that of the male, and her colour generally lighter. I have since observed one, diving in the manner Mr. Dovaston described, at the pit I before alluded to, in the month of May, 1828, when it might be observed any evening for about six weeks, after which time it disappeared, and has never returned since. The water-shrew may certainly be considered one of the rarest quadrupeds in this neighbourhood, as I have frequently searched for them, but have never been able to find any others. There was also another of the *Sòrex* genus, to which I should wish to call your attention, as I have never seen any account of an animal similar to it. It was taken, in the summer of 1827, in one of our clover fields, by the mowers, and brought to me when just killed. At the first sight I took it to be a water-shrew, but, on closer inspection, I found there were none of the ciliations on the tail and toes, which in the water-shrew were very apparent, and white both in the male and female: in size it was 5¾ in., nearly equal to the water-shrew. There are only two sorts of shrews said to be British species, yet, from the characteristic marks of this animal, I am convinced that it must be one; the water-shrew it evidently is not, on account of there being no ciliations as if formed for swimming, and there was no brook or pit near the field in which it was found, and in the summer time I think this animal would not be far from the vicinity of water. The common shrew, Mr. Donovan says, never exceeds 3 in., and this being nearly twice that size, and of a much darker colour, indeed quite as deep a shade as the mole, inclines me to think that it is hardly possible that it can be that animal, or that the common shrew can undergo so great a change both in colour and size. I have the three specimens stuffed. Does the common shrew grow larger or darker-coloured from age, or any other cause? Perhaps some of your numerous and intelligent correspondents can throw some light on this subject. — *W. W. Liverpool, May* 31. 1830.

A Land Tortoise mutilated by Rats. — Sir, Rather a singular occurrence took place a short time ago respecting a land tortoise. I have examined all the works on natural history that I can meet with in this neighbourhood, but can find no satisfactory account of it. Perhaps you would have the goodness to allow an enquiry to be made through the medium of your widely circulated Magazine.

In October last a land tortoise was placed in a convenient corner to spend his torpid winter. He was soon attacked by some rats, which eat away his eyes, tongue, and all the under part of his throat, together with the windpipe. In that same mutilated state it is supposed that he remained about three weeks before it was discovered. On examination I could not discern that the least decomposition had taken place, neither could I discover any symptoms of animation. I then proceeded to open the shell, with the view of preserving it for a museum. I found in the lower part of the shell about two table-spoonfuls of gravel, the grains of which varied from $\frac{1}{12}$ to $\frac{1}{8}$ in. in diameter; there was also a quantity of green matter, which appeared like masticated grass, mixed with a kind of viscid slime, but all was perfectly sweet. After extracting the inside, and taking the bones and flesh from the legs and neck, I applied a large quantity of corrosive sublimate, dissolved in spirits of wine, which I had found to be an effective antiseptic for all animal substances I had before applied it to; but in this case it failed, as a slight putrefaction has taken place. What I want to learn are, if there is any better antiseptic than the one I have tried? or if there is any peculiar method to preserve a tortoise? and if the sleepy tribe are susceptible of sensation whilst in their torpid state? I am, &c. — *William Jones. Post-Office, Ludlow, March* 28. 1830.

Oviparous Quadrupeds (*Amphíbia*). p. 364. — Ought the newly discovered marine animals with paddles to be called quadrupeds? Ought animals formed for only moving in the ocean to be called Amphíbia? — *L. July* 2. 1830.

An Egg within an Egg. — I have lately seen a preternaturally large but perfect goose's egg, containing a smaller one within it, the *inner one possessing its proper calcareous shell.* If, as I have learned from books, the shell is not added to the ovum until its arrival in the uterus of the bird, how could this inner egg acquire its shell? Will some of your readers have the goodness to inform me? — *Anser. June*, 1830.

The Songs of Birds innate or acquired. — Sir, Looking over your Magazine the other day, my attention was arrested by a letter from a Norfolk correspondent on the subject of the notes of birds. The question was, "whether they are *innate* or *acquired.*" Now, really, it appears to me that the habits of the cuckoo render the former conclusive. It is well known that that bird never gives itself the trouble to build a nest, but deposits its egg in that of some other bird; often, I believe, the hedge-sparrow: consequently, the note of the sparrow would be more familiar to it than that of its real parent; yet I imagine the note of the cuckoo, whatever may be the species of its *foster* parent, is always that of its kind. A few years ago I saw, in a town in Devonshire, a cuckoo in a cage, which had been found half-fledged in a field the preceding spring, and transplanted to a house in a narrow street in the middle of the town, a situation where he most probably never saw or heard one of his own species, yet at the sight of his protectress, or when hungry, he would cry cuckoo! cuckoo! in the natural tone; and, what I thought a remarkable circumstance, he would not feed himself, but, though food was always placed within his reach, awaited the return of his mistress, whose avocations occasioned her absence for two or three hours at a time, and then would flutter to the side of the cage, crying cuckoo! cuckoo! as if impatient to be fed. I mentioned this to a gentleman the day after I had seen the bird, who assured me it was a peculiarity natural to a cuckoo never to feed itself, and that the office is performed by some other bird. I own I was incredulous, and am so still, having examined several histories of the cuckoo, none of which mentions it; nor have I met with any one who could confirm it. Certainly the fact of the young bird I saw in the cage not feeding himself, though nine months old, is somewhat corroborative of the gentleman's assertion. I am, Sir, &c. — *F. H. St. Alban's, April* 26. 1830.

The Vocal Powers of the Missel Thrush. — In reference to the communication of J. B. on the subject of the vocal powers of the missel thrush, (p. 193.), I have to say that I believe it to be perfectly ascertained that the missel thrush frequently sings in the manner very accurately described by your correspondent. This bird is now common here; though, twenty-five years ago, one shot in Auchincruive garden excited surprise, and its species was not discovered, even on reference to an ornithological work. As to its song, I may add, that, from attentive observation, it is considered almost as certainly indicative of bad weather as a falling barometer; hence it is occasional, and not confined to any particular season, so that there is scarcely a week in all the year within which its song may not be heard. It often happens that the woods resound far and near with its powerful melody, on a still day in the middle of winter, or very early in spring, when no other songster is heard. I have observed them in the mornings in autumn feeding voraciously on the fruit of the mountain ash, and they roughly beat away the redwing fieldfare from sharing this repast, or from feeding on the berries of the holly. — *Z. Z. Ayr, March,* 1830.

The Missel Thrush. — The communication of J. B. respecting the missel thrush is perfectly correct. I can corroborate every assertion made concerning it from personal observation. In the present year I have heard the bird singing many times, and more particularly towards the end of February. Indeed, in the part of the country where I reside, the missel thrush is vulgarly called the *storm-cock*, intimating that its singing is indicative of *stormy weather*. I am, Sir, &c. — *T****. R—d.*

The Missel Thrush; in answer to our correspondent J. B. (p. 193.)—This bird seems to have two kinds of song, one not unlike the notes of the blackbird, the other very sweet, though in a much lower tone, and more nearly resembling those of the common thrush. I have one which I reared from the nest, and having been kept about a year near a canary, it has to a certain degree acquired its song, as in several notes it has imitated it almost to perfection. I have now had it nearly four years, and it has become a great pet. It eats mostly bread and milk, but eagerly devours snails, beetles, &c. It seems to possess a singular antipathy to worms, as it never attempts to touch them if offered to it. — *James Drummond Marshall. Belfast, May* 25. 1830.

Rooks preying on young Birds. — Is it customary for rooks to despoil the nests of the smaller birds, and devour their young? or is the following occurrence to be explained upon the supposition that rooks, in large cities, finding it difficult to procure worms, &c., to carry to their nests, are glad to substitute other prey?

As I was passing through Chandos Street, Cavendish Square, soon after six o'clock this morning, my attention was attracted to a rook flying low, near the walls of some out-buildings, in which were many holes occupied by sparrows' nests. He directed his flight to one of these holes, into which he thrust himself as far as possible. It was evident that he was attempting to reach something with his bill: but, apparently, he did not succeed; for he shortly withdrew himself from this hole, and flew to another, into which he intruded himself in the same manner. From this second hole he retired almost immediately, bearing in his beak one of the callow brood. He flew with his spoil to a high chimney at the corner house, followed for a short distance by ten or twelve sparrows clamouring loudly at such an atrocious robbery; and one sparrow, probably the parent, ventured to pursue even to the chimney-top, as if determined to assail the fell destroyer; but both the rook and the sparrow quickly disappeared behind the chimney-pot, and prevented any further observation. — *S. M. Brook Street, Grosvenor Square, May* 31. 1830.

Migration and Breeding of Swallows; in answer to W. H. White (p. 194.). — I consider that there is no longer any doubt that swallows, at the end of the year, do leave Europe, even the most extreme southern parts of it, as the kingdom of Naples, Sicily, the Morea, &c., and migrate to Africa and Asia. Of their actual migration, an intelligent traveller assures us, "he had the fullest proof in the immense bodies of these birds, which he perceived pushing their way in the direction of Egypt from Europe during the present month (November), when the winter sets in." (See *W. Rae Wilson's Travels in Egypt*, p. 7.) In solution of your correspondent's last question, "Do they propagate their species there as well as here?" I would observe, that, it being a well known fact that birds, even in a domestic state, will, if kept warm and well fed, frequently nidificate during our severe winter months; so I should certainly say, that the *H*irundínidæ, stimulated by the heat of the countries, and by an abundance of food which Asia and Africa afford them at that season, do propagate. The parent birds perform the rites of a second incubation; and the young ones, or those which in the previous summer were born in Europe, do commence the great command of nature, and in like manner increase and multiply their kind. — *J. H. N. March* 5. 1830.

Mother Carey's Chickens. — A man here who has been much at sea has two preserved birds, which he calls by this name. They are nearly all black, and bear some resemblance to the swallow tribe, but have longer beaks. He says they always forebode a storm at sea, and that there are generally many of them seen round the ship in a storm. I believe them to be the stormy petrel (Procellària pelágica). Am I correct? — *Thomas Morgan. Southampton, June* 21. 1830. Yes. — *Cond.*

The Cuckoo-Mate. — Sir, As I was walking this morning in the garden, I observed a bird called by some the cuckoo-mate, from its generally appearing just before or about the same time with the cuckoo, its note very much resembling the word *peep* repeated about four times in quick succession. I shot it, and from the beautiful appearance it exhibited I was induced to think it might be worthy a place in some cabinet. The greatest singularity belonging to the bird is the great length of its tongue, it being upwards of 3 in. in length, and about half an inch of the point of a stiff horny substance. I will do myself the honour of presenting it to you. Should it prove acceptable, I shall feel highly gratified. Yours, &c. — *C. Spring. Eastbourne, Sussex, May* 3. 1830.

The bird here referred to is the wryneck (*Yúnx* Torquílla of Linnæus); probably so called from a habit it exhibits of moving the head and neck in various directions, sometimes describing parts of circles, at others from side to side, with an undulating motion not unlike the actions of the snake, and in some counties in England this bird is called the snakebird from this circumstance. When found upon its nest, within a hole in a tree, it makes a loud hissing noise, sets up an elongated crest, and writhing its head and neck towards each shoulder alternately, with grotesque contortions, becomes an object of terror to a timid intruder, and the bird, taking advantage of a moment of indecision, darts with the rapidity of lightning from a situation whence escape seemed impossible.

The wryneck is the only species of the genus that visits this country, and forms an interesting link between the cuckoo and the woodpeckers, having the long flexible tail of the former, with the extensile tongue of the latter. They have two toes only projecting forwards, and two turned backwards, a construction of the feet which enables them to climb trees with facility, and sustain themselves in various positions on the surface of the bark while searching for insects. They are often seen on the ground near ant-hills, consuming, as food, large quantities of the ants and their larvæ.

Wrynecks are, with us, summer visitors only, preceding the cuckoo in the spring, and as their line of flight on departing in autumn is in a south-eastern direction, they probably, with many others of our summer visitors, pass the winter in Asia or Africa. The swift, the swallow, and one of our martens, have been seen at Sierra Leone, and the Island of St. Thomas, in the months of January and February.

The anatomical construction of the tongue and its appendages in the wryneck, and the consequent mode of taking its food, are beautiful adaptations of means to an end, and will amply repay the closest examination. By a peculiar elongation of the two lateral portions of the bones of the tongue, and the muscles attached to them, this bird is able to extend the tongue a very considerable distance beyond the point of his beak: the end of the tongue itself is horny, and consequently hard, but by no means pointed. A very large and long gland is situated at the under edge of the lower jaw on each side, which secretes a glutinous mucus, and transfers it to the inside of the mouth by a slender duct. With this glutinous mucus the end of the tongue is always covered, for the especial purpose of conveying food into the mouth by contact alone. I have frequently examined the contents of the stomach in the wryneck, but without finding any fracture or mutilation of the food from the action of the beak, unless the substance proved too large and heavy to be lifted by adhesion. So unerring is the aim with which the tongue is darted out, and so certain the effect of the adhesive moisture, that the bird never fails in obtaining its object at every attempt. So rapid, also, is the action of the tongue in thus conveying food into the mouth, that the eye is unable distinctly to follow it; and Montagu, who had an opportunity of observing this bird feed while confined in a cage, says, an ant's egg, which is of a light colour, and more conspicuous than the tongue, had somewhat the appearance of moving towards the mouth by attraction, as a needle flies to a magnet.

The woodpeckers take their food in the same manner, but with some specific modification in the structure of their tongues. — *S. T. P.*

Whether, by destroying the Buds of Fruit Trees, Birds were, or were not, conferring an obligation, has long, I believe, been a disputed point amongst naturalists; whether those devoured by them were in a diseased state, and containing the larvæ of insects, or whether they were healthful, and likely to arrive in due season at maturity. Witnessing, a few springs since, the havoc made by a number of bullfinches, on two thriving young codlin trees, that for several years had blossomed and borne profusely, and had, at that time, every appearance of health, my curiosity was excited on this subject, and I then saw opened the crops of two of these depredators. They were wholly filled with the vegetable matter on which the birds had been feeding, and which did not appear to contain insects of any kind. Since that time the codlin trees have never grown with so much vigour as they did previously, many branches being so entirely stripped of buds that they never recovered. This spring the trial was repeated, and when the trees were in a more advanced state, in fact, just as the leaves were beginning to expand, and the blossom buds to make their appearance. A culprit bullfinch was killed in the very act, an unswallowed morsel yet remaining in his bill, to bear witness against him. This was a single flower-bud, with all its parts yet entire, but those buds with which its crop, the passage thence to the gizzard, and the gizzard itself, were completely filled, appeared to consist only of the future fruit, with the stamens and pistils attached to it, but stripped of calyx and petals, and of its own internal covering. The anthers, large in comparison with the rest, and nearly as large as they would have been had the flower been suffered to open, were even in that state curiously and beautifully apparent; and, on a careful examination beneath a microscope, no vestige of any thing like disease or insects could be discovered. Beneath the trees themselves the ground was thickly strewed, with the parts of the flower rejected by these nice and accurate dissectors, which parts invariably consisted of the calyx and petals, yet remaining attached together. It appears to me that the buds are destroyed for the sake of the interior parts of the fruit and flower, by these enemies to trees of the *Prùnus* and *Pỳrus* kinds; as cowslips and primroses are by other birds, for the purpose of devouring their minute and yet imperfect seeds. As, however, I would not willingly accuse the innocent falsely, and as I have, besides, some partiality for the race of bullfinches, I should be happy, if in error, to be convinced that I am so, by any who, in the same way or otherwise, may think it worth the trouble to make experiment. — *Corylus. April* 16. 1830.

Tomtit destroying Bees. — Sir, I heard the other day a circumstance connected with the habits of the common tomtit, of which I was totally unacquainted, never having seen it noticed in books of natural history. It is that of its propensity to destroy bees: which it effects by rapping with its bill at the entrance of the hive, and killing the insects as they come out. I was informed that in this manner a whole hive has been quickly destroyed by this tiny depredator. Perhaps this is not new to some of your correspondents, who may be able to give a more distinct account of this circumstance, and to state if the bird destroys the insects to satisfy hunger, or merely to gratify that love of mischief for which they are remarkable. Yours, &c. — *H. Great Missenden, February* 15. 1830.

Wasp's Nest. — I beg to inform your correspondent, G. M. of Lyme Regis (p. 94.), that the nidus figured by him is the production of a species of social wasp. This kind of nest does not appear to be described either by Kirby and Spence, or in the *Insect Architecture* (which latter work I would strenuously advise every lover of nature to possess himself of). It has, however, been figured and described in the *Journal of a Naturalist* × p.333. as the nest of *Véspa campanària.* It is to be regretted that your correspondent did not furnish you with more specific details respecting the nest. Indeed, had he waited for a few months, and profited by your often repeated recommendation of that spirit of observation and investigation so essentially necessary to the success of every one aspiring to the rank of a naturalist, he would doubtless have himself obtained a reply to his own question; and the answer would at the same time have been accompanied with no slight degree of interest, arising from the probable discovery of some new fact, or the impression on his mind of some new observation respecting the natural habits and characters of the insects under investigation; since it cannot be doubted that, if at the present time (notwithstanding all the observations of Reaumur, the Hubers, &c.) fresh facts and observations upon the hive-bee are daily presenting themselves, the less known insects will afford the attentive observer a fund of novel amusement in the investigation, which will amply repay him for his most sedulous attention. — *J. O. Westwood. February* 7. 1830.

The "Nidus attached to a Reed" (p. 94.) is certainly the nest of a wasp similar to that figured in plate 7. of the *Journal of a Naturalist.* — *W. C. T. January* 28. 1830.

Flies and Butterflies. — A few years ago I observed some of the greenish and black-marked worms which are found on cabbages, &c., take up their winter quarters preparatory to their usual change, and that some of them died without forming a chrysalis, but throwing out a silky substance round them, which was shortly after filled with a number of minute eggs. I kept a chrysalis, and also some of those eggs, in a box till the next summer, when the former produced a white butterfly with black spots on its wings, and the latter produced from every egg *a small dark brown fly.* I cannot suppose a butterfly to be the parent of a very different insect, and therefore shall be obliged if any of your numerous correspondents will favour me with an explanation of this. I am, Sir, &c. — *Thomas Morgan. Southampton, June* 21. 1830.

Two Curculios. — I send two insects which appear to me to belong to the Curcùlio, and beg for information as to the real name, and the manner and time of undergoing the different transformations. I took them off some beans in my garden; but they appear to me to be the same insects that I have observed on beans, peas, tares, and even clover, ever since the dry year of 1826, when they did much mischief. They are most easily found in a warm sunny day, but are apt to be alarmed, and take shelter under small clods; and they are found very plentifully upon strong soils when the clods are removed. Is it the larvæ of this insect which we sometimes find feeding upon the pea when the husk is opened? I see Mr. Rennie says the larvæ of some of these species produce the anbury on the turnips and the knots on the roots of cabbage. (*Insect Architecture, Library of Entertaining Knowledge*, p. 389.) — *J. C. Farmer. May* 29. 1830.

A Grub injurious to Oats. — Will any of your numerous correspondents give some detailed information respecting the grub which is so very injurious to our oats; of how many species of the *T*ípula the larvæ are injurious, by what names they are called; the distinction between grub and wire-worm; at what time the egg is laid, the larva hatched, and when it is found as the chrysalis and perfect insect? An answer may lead to some practical results. — *Id.*

Cárabus crépitans and C. *nemoràlis.* — I was fortunate enough last autumn to procure a specimen of Cárabus crépitans *Lin.* and *Latreille.* The explosions which this insect is enabled to make, when disturbed or irritated, are very distinctly audible, even at a little distance, but the accounts we have of them are greatly exaggerated. The sound emitted by this specimen was something between a chirp and the report of a small piece of artillery, with which we were wont to amuse ourselves "in days gone by," commonly called a "potato gun;" but I must say I could not perceive the slightest appearance of smoke, by which some have alleged the explosion is accompanied; nor were our olfactory nerves gratified by any of those fetid odours, the power of emitting which has been ascribed to this insect by some naturalists. Of the same genus I also took in the garden the *C.* nemoràlis *Linn.* and *Lat.*, which, so far as I know, has never been described as a *British* insect. Latreille describes it as a native of *Europe.* The body is black; thorax with violet-coloured margins; elytra, obscure copper-coloured, rugose, and having hollow dots in a triple series. May I beg the favour of any of your entomological correspondents to inform us whether they have met with this species in Britain? I am, Sir, &c. — *A. L. A. Alnwick, April* 7. 1830.

Pteróstichus parumpunctàtus. — The insect described by T. H. (p. 50.), a specimen of which he has been so obliging as to forward to me, is, I have little doubt, the Pteróstichus parumpunctàtus of Dejean. It is fortunate you have given so good a figure of the insect whose curious economy is so interestingly detailed by T. H., as it enables us to correct an error into which he has fallen respecting its name. The Proctotrùpidæ of Latreille have abdomens more or less peduncled, the superior wings have very few nervures, and no discoidal cells, and the inferior not more than one nervure. Platygáster, to which, probably, Linnæus's *I*chneùmon ovulòrum is nearly related, has the wings altogether destitute of cells. It is therefore evident that T. H.'s insect belongs to another family, namely, to the *I*chneumónidæ of Latreille, and may possibly be the *I*chneùmon glomeràtus of Linnæus. However this may be, it certainly is a true Microgáster of Latreille, and of all modern authors. By referring to Linnæus's *Faúna Suécica* T. H. will see that the *I.* glomeràta is produced in the same way as his insect, whereas the *I.* ovulòrum is bred from the *eggs of Lepidóptera*, and must, consequently, be exceedingly minute. On the 1st of May I hope to illustrate the genus Platygáster, and thereby enable students to recognise the species belonging to this imperfectly known group. (p. 51.)

Leìstus montànus. (p. 171.) — This insect was unknown before Mr. Dale and myself visited Skiddaw: we each took a specimen near the summit of that mountain, in July, 1827, and Mr. Dale proposed the specific name that it bears. It was first recorded on the wrapper of the forty-fifth Number of Curtis's *British Entomology*. It has since been taken by Mr. Marshall, and last September on the side of Cader Idris, Merionethshire, by Mr. Francis Walker of Southgate. — *J. Curtis.* 4. *Grove Place, Lisson Grove, March* 23. 1830.

The " Skate Spawn" enquired about (p. 93.) is certainly a species of Medùsa. — *W. C. T. January* 28. 1830.

Silver Fish. — In reply to the query on the silver fish (Vol. II. p. 102.), it may be stated, that the fish so called is merely an accidental variety of the gold fish (Cýprinus auràtus *Linn.*), which varies in colour from age, food, the kind of water in which they are bred, &c.; the greater number being of a golden orange colour, many white, or silvery, and others of one or other of those colours, mixed with large patches of black; they also vary in the shape and size of the fins and tail, which last in some is disproportionately large, and divided into three long lobes. These beautiful fish, originally natives of China and Japan, were probably introduced into Portugal at an early period, after the people of that country had discovered the route to the East Indies by the Cape of Good Hope, as they appear to be now completely naturalised, and abound in many of their streams, whence they are brought to us by trading vessels from Lisbon, St. Ubes, &c., in large earthen jars, and may be had a very easy rate before they get into other hands. They have also been introduced and naturalised in the Mauritius by the French, where they now abound in fish-ponds and streams, and are served up at table with the other fresh-water fishes, to the brood of which they are thought to be very inimical, by destroying their spawn and young fry. The extreme elegance of the form of the golden carp, the splendour of their scaly covering, the ease and agility of their movements, and the facility with which they are kept alive in very small vessels, place them amongst the most pleasing and desirable of our pets. — *J. T. Cork, March,* 1829.

Sex of the Lamprey, &c. — Sir, In the *Quarterly Review* for November, 1829, No. 82., in the Art. Systems and Methods in Natural History, by J. E. Bicheno, Esq., the following passage occurs in p. 325.:—" In the lamprey the male and female organs of generation appear, from the observations of Sir Everard Home, to be united in the same individuals, so as to render conjunction unnecessary; the eggs, when expelled, are naked, and each contains a single fœtus; in the leech, the hermaphroditism requires the union of two individuals; the eggs, when expelled, are covered with a spongy matter, and each contains several young." As in this extract, there is a comparison between the leech and the lamprey, it would seem to refer to the lesser lamprey, both abounding in the rivers of this country. I recollect having read (some years ago) part of a memoir, said to have been read at the Royal Society, reported to be by Sir. E. Home, wherein the lamprey was represented as having the peculiarity of one sex, or rather the sexes united; in short, that all were spawners, and emitted eggs. Having been at that time struck with the assertion, and knowing it to be contrary to what I had generally observed, I considered it as an opinion too hastily made, and which further experience might contradict or rectify; but having seen the belief of it introduced into another work, I have since more particularly noticed the lamprey, and to me it appears, as it always did, that the milter and spawner are as distinct in that species, as in the cod or the herring; and of course the spawn or eggs are emitted under the same circumstances. The milters, which run smaller, often are more in number than the spawners, but the sexes are perfectly distinct. I speak of the common lamprey (Petromy̆zon fluviátilis). The common and vulgar name, although used not so much as formerly, is Lampern. The fishermen on the river are well aware of the fact of their having roes or eggs, in the same way as in other fish; that is, about half and half, as they are continually opening them for the purposes of cookery. How any of that class of men could acquiesce with Sir Everard Home, who refers to them in support of his hypothesis, in the memoir in question, is very strange.

What the habits of the larger lamprey, or sea lamprey, may be (not being able to procure any at present), I do not know: but from having nearly the same aspect, I should suppose there is no material difference.

Your correspondent, J. Carr, justly observes, at p. 196. of your last Number: " It is universally true, that all anomalous productions in nature are limited to individuals."

Can any of your correspondents, acquainted with the fact, explain wherein the difference of the larger and lesser lamprey consists? Are they distinct; or, from their age, and acquiring more nourishment in the sea, do they come to a larger size, as the salmon is supposed not to grow to any bulk in fresh water?

There is also, in the sands of the Thames, during the summer season, a small worm, about 4 in. long, called by the fishermen a sandprey, in the number of breathing holes on each side resembling the lamprey. Are they the fry of the above named fish in their progressive state, or are they a distinct species?

I put these queries in full belief, that articles of natural history are inserted with no other authorities than what are copied from each other. As the Rev. W. T. Bree quotes, in your last Number: " Natural history ought to be studied as a collection of facts, not as the history of our guesses or opinions."

Lately I observed two water newts in a pond: one had acquired an enormous size; it was spotted and coloured much like the larger lamprey; the smaller one was of a uniform and brighter colour, and appeared, when compared together, to have full as much difference as between the two sorts of lampreys. I supposed them, notwithstanding, to be of one species. Colour and magnitude are not always sufficient distinction. The larger lamprey is said to have more teeth, — that as well as magnitude may be an effect of age; the organisation should perhaps differ, to form a different species. I am, Sir, &c. — *An Old Angler. Brentford, April* 13. 1830.

Queries respecting the Natural History of the Salmon, Sea-trout, Bull-trout, Herling, &c. — The value of the salmon fisheries in Great Britain has decreased so much of late years, and particularly in the north of England and south of Scotland, that a remedy for it, independently of its interest as a difficult and unsolved question in natural history, will become of no little importance to proprietors. The following queries are proposed, with the view and with the hope of gaining some information upon the natural history and economy of this valuable species. It is only by arriving at a correct knowledge of its various habits, and those of the species allied to it, which frequent our rivers in almost equal numbers, that we can hope to devise or accomplish any means of increasing the production, or of decreasing the certainly too extensive destruction of it in its different states. The queries relate only to its natural history, and answers are earnestly requested, stating facts relative to the opinions given, with the suggestion of additional queries, or any thing that will tend to illustrate the history of the species. Address the answers to Sir W. Jardine, Jardine Hall, by Lockerbie, Dumfriesshire.

Salmon. — 1. At what age do salmon commence spawning? and how often is it supposed that they have migrated to and from the sea, previously to their first parting with their spawn? — 2. Do the males and females attain maturity at the same period or age? and do all of one age spawn nearly at the same season? — 3. At what time do the young, or fry, first leave the rivers? — 4. When do the young, or fry, first return to the rivers? — 5. What are the size, weight, and appearance of the fry, on their first return from the sea, and under what denomination do they then go? — 6. Are they so far arrived at maturity as to spawn, and be productive, on their first return from the sea, or previously to a second migration? — 7. Are any fish known to shed their spawn abortively, before they arrive at their full growth or maturity? or is the spawn observable in young fish retained until the parents attain the ordinary growth and size of the species when it is known to be productive?

Grilse. — 8. Are grilses immature salmon, and if they are, what is their age? — 9. What is the distinctive character between a large grilse and a small salmon? — 10. At what season do grilses first appear in the rivers? What is their weight? and are they supposed to be the fry of the same year, on their first return from the sea? — 11. Have the fry been marked, and afterwards taken as grilses in the course of the same year, and have grilses been marked, and afterwards taken as full-grown salmon? — 12. Is it supposed that any sexual intercourse takes place between the salmon and other species of the genus, thereby producing a mongrel or mixed breed of fish?

Whitling and Sea-trout. — 13. Does the whitling of the Tweed ever become a salmon? if not, to what size and weight does it attain? — 14. Is the whitling of the Tweed known by any other name in its various stages of growth? Does it spawn, and at what season? What are its migrations? — 15. Is the sea-trout of some other rivers the same with the whitling of the Tweed? Is it found in all rivers containing salmon? Does it spawn? Is the young, or fry known, and what are its migrations?

Herling. — 16. Is the herling or hirling of the Annan and Nith, and the whiting of the Esk in Cumberland, the same with the finnock of the west coast of Scotland, and the sewin of the Welsh rivers? — 17. Is the herling found in the rivers on the eastern coast of Scotland, or in any of the rivers in England or Ireland, and under what name or names is it there known? — 18. Does the herling spawn, and at what season? and is it known in any intermediate state between the fry and herling? Is the fry known, and what are its migrations?

Bull-trout. — 19. Is the bull-trout of the Tweed the same with the salmon trout of the Tyne and Tees, &c.? and is it known by any other name during its growth from the fry to maturity?

20. Is the parr met with in all rivers containing salmon? where and when does it spawn? Is it the same with the brandling of the north of England, and the skirling of Wales? Is it supposed to be a perfect fish, or the fry of some species of salmon?

21. What is the grey (*S*álmo E'riox) of Dr. Fleming? What are its states from the young to the adult? What are its migrations?

22. Are there any species of migratory salmon, distinct from those above mentioned, known in the rivers of your neighbourhood?

Dugong. — Of all the finny tribe, the dugong (?) is that which approaches nearest to the human form. It is able to raise itself erect in the water;

and when its head and body are above the surface, and its fins, which resemble hands, are visible, it may be easily mistaken by superstitious mariners for a semi-human fish, or mermaid. (*Furet de Londres.*) What is a Dugong? — *W.* *Feb.* 11. 1830. [One of the Cetàcea. *Cond.*]

The curious Worm found by your correspondent W. W., and described p. 103., is, as he rightly conjectures, a species of Górdius, so called from the complicated knot which they are capable of forming with their long and thread-like bodies. I once found them in considerable numbers, after showery weather, on a bed of young turnips, during the early part of summer, in this vicinity, having discovered them by the circumstance mentioned by W. W., of the greater length of the body being elevated above the herbage, and waving to and fro in the air. The garden in which these occurred was also walled in, but had a small well or spring, not far distant from the bed of turnips, and from which all the seed-beds were watered in dry weather; from which I, at the time, supposed they were derived. Whether this was the case; or whether their ova were brought thither by the winds, and developed themselves amongst the moist leaves of the turnips, and that they are really terrestrial, must remain undetermined; as also the object of their curious movements in the air; and the power which has been given them of mounting along the stems and leaves of plants, which has been denied to every other kind of worm with which we are acquainted. A very absurd opinion is still held in regard to the Górdius, or hair-worm, by the vulgar, which it may be worth while to mention, viz. that they owe their origin to the long hair of the mane and tail of horses, which, on remaining a sufficient time in water, they conceive to become animated, and converted into these slender worms. — *J. P. T.* *Cork, March,* 1829.

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Substance drawn up at Sea (*fig.* 117.), *in 7 or 8 fathoms Water.* Oct. 23.

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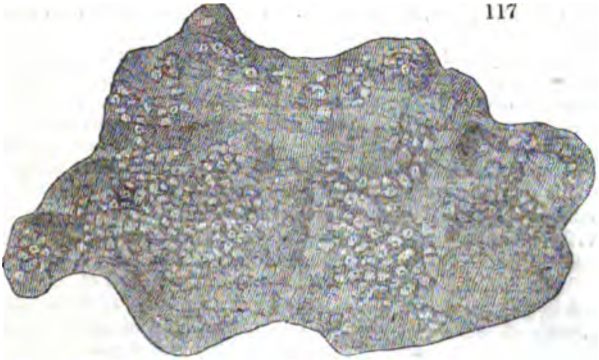
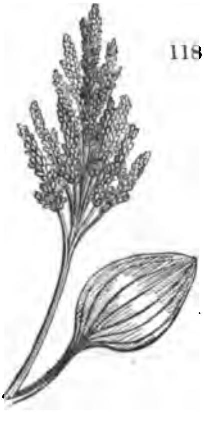


1829. — It was about the size of a child's head, but depressed. It had been attached to the ground on the under side, but was torn off: on the upper, flattish, irregular, with prominences like the teats of a cow, only somewhat less, and turned a little on one side. Consistence rather soft and yielding, but not retaining an impression; covered with a skin the surface studded with flat tubercles, each with a mark in the centre, but no perceptible orifice. Colour, a bright yellow. Internally, it is full of irregular channels, leading from the surface, and freely anastomosing. Query, its scientific name, situation, and relations? — *J. Couch.* *Polperro, June,* 1830.

Three new Species of Rùbi (?). — The following is a description of three *R*ùbi which I have met with in this neighbourhood, and which are not mentioned in Sir J. E. Smith's *English Flòra.* Probably one or two will prove to be species new to this country. If you should consider this account worthy of being inserted in your Magazine, you will, perhaps, do so, and oblige, yours, &c. — *I. E. L. Richmond, March* 5. 1830.

1. *R*ùbus. Stem angular, scarcely hairy; prickly. Prickles very small, not hooked, few; glandular bristles, none. Leaves ternate, upper simple; leaflets ovate, large, rounder than in *R*. glandulòsus, and more unequally serrated, even jagged; dark green above; beneath, very soft, and clothed with fine silky hairs. Lateral leaflets deeply lobed at the outside. Stipulas linear lanceolate. Panicle dense, leafy, upper part almost umbelliferous; flower stalks very hairy, not prickly. Sepals ovate lanceolate, obtuse, unarmed, but clothed with soft hairs: after flowering, deflexed. Approaches near to *R*. leucóstachys of Smith, but differs in not being at all glandular (by which it may also be distinguished from *R*. glandulòsus) or so hairy, and calyx not prickly at the base. — 2. *R*. Stem angular, hairy, prickly, reddish; prickles numerous, hooked, particularly those on the leaves of the barren stems, which are quinate; the three terminal leaflets are long, blackish, angular, and very prickly footstalks, also rather hairy. Leaflets finely serrated, with a very prominent point, dark green above; beneath, clothed with fine white soft hairs, not woolly. Leaves of the flower stem ternate, more strongly serrated. Panicle cylindrical, simply compound, hairy, with a few scattered straight prickles; bracteas linear. Sepals narrower than in the last, and more pointed; hairy, unarmed. This species answers precisely to none of those described in Smith's *Flòra*. — 3. *R*. Stem angular, perfectly free from hairs or bristles; prickles deflexed, not hooked, upon the angles of the stem. Stipulas narrow. Leaves quinate; those of the flowering-stem ternate. Leaflets large, jagged at the edges; terminal one on a long hairy footstalk, the two lateral sessile; above, dark green; below, paler; not at all hoary, rather downy. Panicle long, straggling, smooth, and leafy, twice compound. Sepals ovate, unarmed; running out to a very fine point, not deflexed. The two lateral leaflets not lobed, as in *R*. cæ̀sius and corylifòlius, which they most resemble.

Curious Variety of Plantàgo *màjor*. — Sir, I send you the following description of a curious variety which I met with of the *P*lantàgo màjor, hoping that it may prove acceptable to some of your readers. I rather think it is of rare or at least partial occurrence, since I have never seen any other specimens except those which I have in my possession; nor have I heard of any being found. The principal difference is in its mode of inflorescence, in which it disagrees very materially with the *P*. màjor. Instead of being in a compact spike, it is very much branched, as it is figured beneath (*fig*. 118.), and of a light green colour. In all other respects, it agrees with the species mentioned above. My specimens were sent me from the neighbourhood of Durham, two or three years ago. Sir Edward Smith refers to Gerarde, if I mistake not, who gives a plate, and description in his usually quaint manner, from which a very tolerable idea of the plant may be formed: he names it *P*lantàgo panículis spársis. For the benefit of your readers who do not possess a copy, I subjoin what he says upon it: — "This plantain must not here be forgot, though it be somewhat hard to be found: his leaves, roots, and stalks are like those of the ordinarie; but, instead of a compact spike, it hath one much divided after the manner as you see it here expressed in the figure, and the colour thereof is greenish." Perhaps this plant ought hardly to be reckoned as a distinct species; though it is certainly very distinct, as a variety, from *P*lantàgo màjor. I am, Sir, yours, &c. — *I. E. L. Richmond, June* 13. 1830.



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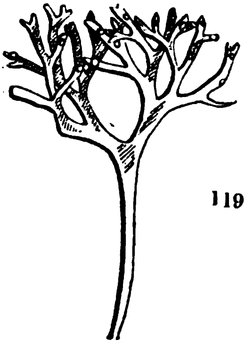
Carrageen or Irish Moss, and Duck's-foot Conférva. — Sir, I am anxious to exchange a little practical for some scientific knowledge, through the medium of your Magazine. I have no doubt, the advantage will be all on my side, though you may chance to have readers to whom my information may be useful. Last autumn, a friend gave me a packet of *sea-weed*, to make a jelly for coughs, and I found it an effectual remedy; It was gathered on the coast of Ireland, and called by the country-people "carrageen or Irish moss." (*fig.* 119.) On my arrival here, in Dec. 1829, I found a considerable quantity on the shore. I considered it a common white *Fùcus*: it approaches nearer to Withering's *Fùcus* álbidus than to any I can discover. It forms, after boiling, a strong transparent jelly; and, with the admixture of lemon and sugar, is a very agreeable medicine. For the last two months, there has been none on the shore; and although we have now a very weedy beach, it was after a long search I found the small specimen enclosed. In my collection of marine plants, I have much of what is vulgarly called Duck's-foot Conférva (*fig.* 120.), but which is, I presume, a coralline. Under the latter supposition, I was surprised to find that, on exposure to the fire, it emitted a powerful acid smell, similar to that of lemons. I should be glad to hear this accounted for, and also to have the correct names of the enclosed. With sincere thanks for the pleasure derived from the perusal of your interesting work, I remain, Sir, yours, &c. — *Brighton, April* 20. 1830.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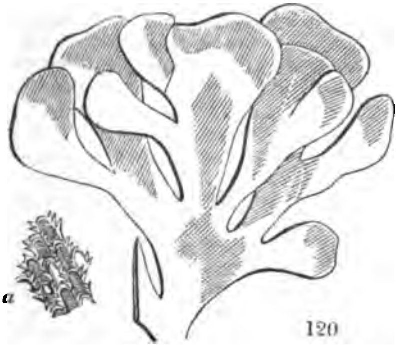

a, A portion of the surface magnified.

The Carrageen or Irish Moss (*fig.* 119.) is the *Fùcus críspus* var. 8. of Turner's *Históría Fucòrum*, vol. iv. t. 217. f. c. The Duck's-foot Conférva (*fig.* 120.) is the Flústra foliàcea of Ellis's *Coroll.* t. 2. f. 8. — *D. D. May* 22. 1830.

A Fossil Trilobite. — Sir, Having lately met with a fossil of the trilobite species (*fig.* 121.) in a part of the country where nothing of the kind, as far as I am able to ascertain, has ever been hitherto discovered; and, as Mr. Sowerby justly remarks that "trilobites occur only in transition rocks, and the lowest beds of the mountain limestone, their presence in any country is an important geological feature;" I take the liberty of sending you an account of the same, which may probably be

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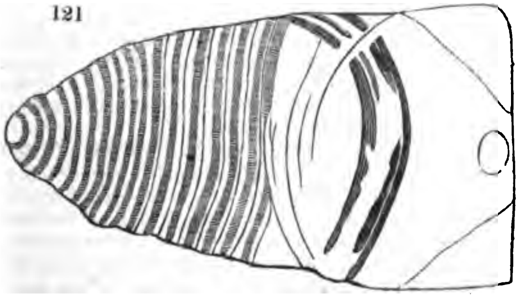

Whitcliff Hill, adjoining the fine demesne of E. L. Charlton, Esq., near Ludlow, Salop, some time last summer, and came into my possession in the beginning of this year, through the hands of the person who found it. It appears to me to be a fine specimen, and very perfect, with the exception of part of the head. It is embedded in micaceous sandstone; but the hill in which it was found is, I believe, chiefly composed of limestone. I herewith send you a sketch of it; but, being a rough draughtsman, it is very much inferior to the original. I should be glad to be informed, in your next Number, of the systematic name of this trilobite, as it appears to me that none of the species figured in your Magazine are of this kind. I am, Sir, &c.—*John Evans. Broad Street, Worcester, March* 12. 1830.

We sent the original to Mr. Sowerby, who is not able to determine the species. — *Cond.*

The Eagle-stone, or Ætites. — This is a hollow, crustated, or flinty stone, containing a nucleus within, which rattles when shaken. Large strata or beds of the coarse sort are said to be found near Trevoux in France, within a few feet of the surface. The popular tradition of it is, that it is carried to the eagle's nest while sitting, in order to prevent her eggs from rotting; and Mathiolus goes so far as to say (*Rees's Cyc.*, vol. i. Ætites) that birds of prey will go in search of it as far as the East Indies. The form is usually a rounded knob, rather approaching to the kidney form; the surface is foul with earth, but the external rind is metallic, and nearly as glossy as silk. The kernel has not any lustre at all. Can you or any of your readers inform me where it may be found in this country? — *H. D.*

Effects of Heat and Cold, relative to Vision; in answer to Y. (p. 200.) — The apparently diminished size and distance of the objects in both the cases noticed by Y., under " Effects of Heat and Cold relative to Vision," at p. 200., admit of an easy explanation, without reference to the influence of either heat or cold. The intensity of light must necessarily decrease, not only as the distance of the centre from which it radiates increases, but in proportion also to the imperfect transparency of the medium through which it passes. The eye accustomed to these facts, under common circumstances, judges with tolerable accuracy of the comparative distances of objects; but a greater or less degree of transparency in the atmosphere will be found considerably to disturb this judgment: a fog, for instance, is said to magnify objects, when the truth is, that, by diminishing the intensity of light, it makes objects seen through it appear farther distant, without lessening the visual angles subtended by them; and because an object at two miles, subtending the same angle as an object at one mile, must be twice as large, the conclusion is drawn that the dim object is large. The reverse takes place when the atmosphere is unusually pure and transparent; for then the lights of objects appearing bright and vivid, while the visual angles they subtend are not altered, they appear diminished in size and distance. But the eye judges of the distance and size of an object, not only by the brightness of its light, and by the magnitude of the angle it subtends, but in a great measure, also, by comparing it with other objects intermediate and lateral. Now, in both the instances quoted by Y., these material aids were wanting: in the first, from the absence of other objects; and, in the second, from the situation of the spectator excluding them from view.

The kind of Mirage noticed by your correspondent Y., I presume, is that so common in intertropical plains in hot dry weather, when the traveller, looking round, fancies he sees on all sides extensive lakes, reflecting the images of the distant mountains, of the islands with which their surfaces appear studded, and of the trees and buildings which adorn their margins, or rise up in the midst of their waters. This phenomenon, when seen for the first time, seldom fails to deceive a stranger, who, it may be supposed, is pleased enough to have such a prospect where he expected " a dry and thirsty land;" though, perhaps, rather puzzled as to his way through such a waste of waters, and sometimes wondering at the length of time he is in reaching any of the long-seen lakes; at last, probably, climbing some mound to take a better view, great is his astonishment to find the delightful scene vanished; and, in place of the refreshing sheets of water, the parched and dusty plain. These appearances are most commonly seen where there is no vegetation, where the soil is dry and black, and the day hot and calm, or with but very little wind. Much, however, depends on the height of the observer's eye above the surface of the ground: the imaginary water diminishing in extent, and withdrawing to a distance, and, perhaps, at last disappearing, as he raises himself; and extending and approaching as he sinks down. The phenomenon is seen to most advantage when the water appears not less than a mile distant, with a background of lofty trees or distant hills: the illusion then is perfect, which it is not when it seems to approach close; for the watery appearance, in such a case, dances and trembles in the air, near the eye, losing its likeness to reality. As I am not satisfied with Y.'s proposed explanation, and have never seen any other, I beg to offer the following, which, I think, accounts for the whole of the appearances above noticed.

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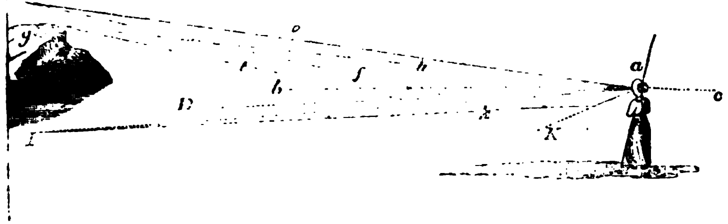

Let the observer (*fig.* 122. *a*) be placed in a situation where the air, near the surface of the ground, is heated and rarefied as far as the line *b c*; the influence of the heated earth not extending further, or the rarefied air being swept away or cooled by a light air of wind as it rises above it: let rays of light proceed from points in the sky, as *d*, in a direction towards the eye of the observer (*d e a*), and towards the earth (*d f*); the former will reach him in almost a direct line, but the latter, passing into a rarer medium at the line *b c*, will be bent or refracted *, and enter his eye in the direction D *a*, producing an indistinct image of the sky, similar to what would be formed by still water placed at D. In like manner, let rays proceed from the distant hill (*g*), towards the observer (*g h a*), and towards the ground (*g i*): the former will suffer but little refraction; but the latter, being bent on entering the rarefied air at *b c*, will reach him in the direction I *a*, producing an indistinct shade or image of the hill at I. The consequence is, that the observer (*c*) will see the appearance of a lake at D, with an indistinct image of the hill (*g*) reflected in at I; for it is obvious that he cannot see the *ground* at I or D, the rays (*k*) proceeding from which being either bent upward too much to reach the observer at *c*, or arriving in the direction K *c*, and producing, on the similarly coloured foreground, no distinguishable image. It will be seen, without farther explanation, that, as the observer raises himself more and more out of the rarefied air, more and direct rays from the base of the hill will be enabled to reach him, and the refracted rays from the sky in extent. As he sinks down, the reverse will take place: fewer and fewer, and at last no direct rays from the hill will reach him, while the refracted rays from the sky will arrive more and more bent: thus bringing the watery appearance nearer and nearer; till, finally, when his head is close to the ground, every terrestrial object, except the spot on which he is placed, will disappear, and he will find himself totally enveloped in what will seem tremulous white vapour. — *A Subscriber. March* 23. 1830.

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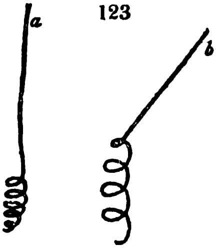
* The rays will be bent in a curve line, not at an angle, as represented in the sketch, in order to show, with less confusion, the direction in which they reach the eye.

The Weather; in answer to Mr. Gorrie. — Sir, Your valuable correspondent Mr. Gorrie (Vol. II. p. 177.) has proposed a few very natural and curious questions, which, if satisfactorily answered, may afford some amusement to your readers. His questions, in their order, are, first: —

"Why is the awn of the wild oat, &c., more straight when the hygrometer indicates saturation than when the air contains less moisture?" To answer this, a short description of the awn of the oat must first be given. It is composed of two parts, a spirally formed base and a simple bristle-like apex: the former is contracted by a rotatory motion in damp, and relaxed by a contrary motion in dry, air. The like effects are observable on all cordage, string, and every description of *twisted* material. The water received among the plications of the tissue swells the threads of which it is composed: of course, each thread is forced from its longitudinal to a more transverse position, thereby increasing the diameter of the cord, while it reduces its length. It is on account of this property that whipcord, catgut, string, &c., have been used to form common hygrometers; and some of the most delicate instruments for indicating the state of the air, as to moisture, are formed of the spiral base of the wild oat. To be convinced of this moving power of the awn, let the naturalist separate one from the ear, and, holding the base between his finger and thumb, moisten the awn with his lips: it will be seen to turn round for some time; which motion is caused by the collapsing of the volutes of the spiral base. That the awns are all more straight, and mostly pointed in one direction in damp weather, is perfectly true: they are so, because they are coiled up as in *fig.* 123. *a*; whereas, when the air is dry, they are relaxed into the form *b*.



The use of the aristæ, or awns, in vegetable economy, is supposed to be for the purpose of attracting or discharging electric currents necessary for either the protection or maturation of the plant.

Mr. Gorrie's second question relates to the collapsing of the flowers and leaves of plants before rain. Many plants, and particularly those named in the question, take a kind of repose during the night. The light and heat of the sun are the stimulants to their rigid expansion and developement: but when his influence is withdrawn during night, or partially during the day, the petals of flowers contract, and the petioles of leaves lose their rigidity, or relax in a contrary direction to what they had in the day; and as rain is commonly preceded by a lower temperature and clouded sky, the plants affected by the direct influence of the sun are soon sensible of the deprivation, and droop or collapse accordingly. Light is, therefore, the principal cause of expansion, and the want of it occasions flaccidity. Even artificial light will open flowers that have shut themselves up for the night: a crocus has been expanded by the light of candles! On this subject it is necessary to add a few remarks, viz.: — Some flowers and leaves seem to be affected by the light, and others chiefly by the heat, of the sun; if, however, they receive either too intensely, they suffer and are withered. Instead of a temporary cessation of their vigour, as is the case before rain, it is an injury which only a refreshing shower and darkness can recover. Again, many plants are most active in growth, and most completely expanded, during the night; and some, from their extreme delicacy of structure, seem only fitted to blow in darkness or twilight.

The next question regards the motions of moles, dew-worms, and the croaking of toads before rain. With respect to the first two, the motion of the worm and its approach to the surface, account sufficiently for the bustle of their natural enemy the mole. But what it is that actuates the worm is the question. Here I can only offer a conjecture. The dew-worm delights in humidity: it is necessary to its existence. But what instinctive presentiment can the worms have that rain is about to fall? They seem to be sensible that a change is about to take place, nay, that it actually has begun to take place; for otherwise they could not be affected by it: and, yet, we ourselves are seldom aware of the coming change. We must conclude, therefore, that there is an invisible precursor, which powerfully affects them, which is unnoticed by us. Now, we know that, before the atmosphere can discharge the water it holds in solution, it must be deprived of *that agent* which makes it a solvent. This agent must be an invisible subtle fluid, pervading the earth as well as the air. As it descends or passes imperceptibly away, we, indeed, can see minute drops of water deposited on cold and solid bodies: leather and saline substances become moist; the sky appears muddy near the horizon; misty clouds form on the tops of hills; the lower stratum of the air becomes more dense; animals are restless; the human frame is languid, and any vitiated part of it aches with shooting pains.

These are the visible and sensible indications of a change from dry to wet weather, but which are by the bulk of mankind generally unnoticed; and it is only the meteorologist, whether philosopher or shepherd, who marks and memorandums them.

Our instruments (especially the barometer) are but imperfect: they have not the fine sensibilities of the dew-worm, toad, &c.; they indicate only what is, not what is to be. The pressure of the atmosphere is more or less, according to the depth of the aerial ocean, or according to its motion or rarefaction, which lessens its ponderosity. Such changes the barometer does show, but they are not always signs of either fine or foul weather. Thermometers, as usually constructed, are most useful gages for indicating the degrees and changes of temperature. Pluviometers, hygrometers, anemometers, &c., are all useful adjuncts to the study of meteorology. But there is an instrument still a desideratum in science, and, if such could be constructed suitable for practical purposes, it would be perfect as a weather-glass. I mean an *Electrometer;* not such as are only fitted for the study of a philosopher, who has leisure to watch and observe the vibrations of gold leaf; but such as would be an ornament, not " idly kept for show," on the mantel-shelf of a farm-house. Such an instrument, that would indicate the *presence*, *quantity*, *direction*, and *character* of the electric fluid, is, I think, every thing we want, to make us " weather wise." By this we would know when the solution of water in the air was going on; when the air was fully saturated; when the water would again become condensed; and, like the worms, be able to apprehend, by a kind of prescience, when its descent to the earth would take place.

I therefore think, with respect to worms, toads, cats, and other animals, that they are peculiarly sensitive of electric impressions, and that it is the descent and character of that wonderful fluid, which warns or rather stimulates the worm to rise from below to the surface of the earth: but how, or in what manner the animals are affected, I must leave for others to explain.

Before I conclude, I beg leave to bespeak Mr. Gorrie's assistance in explaining the use of the new instrument called, I believe, a differential thermometer, and the true character of its indications. A " dew-point " is spoken of: is this a point of nature, or of art? Is it produced by natural phenomena, and variable according to natural circumstances, or is it only an indication arising from the mechanism of the instrument? We know that any solid body, presented to warmer air, begins and continues to be moistened till its temperature is equal to that of the air. Now, which degree of this increasing moisture on a body cooled down by artificial evaporation can be properly called "the dew-point?" It begins (whether visible or not) at the second degree below the temperature of the air, and continues as long as a lower degree of heat can be obtained by evaporation, how then can any degree of this process be fixed on, to be called the dew-point? Again, what is inferred from the appearance of moisture on the cold body: does it show the quantity of water then in combination with the air, i. e. the degree of saturation; or does it indicate the solvent power of it? I conceive there are three very distinct states of the air; it is either taking up, is saturated, or letting go the water with which it enters into combination. The indications of instruments invented to mark these different states of the atmosphere should therefore be described in proper terms; a lower temperature produced by evaporation should not be attributed to radiation, nor should any degree of the solutive power of the air be called a degree of saturation.

The "Remarks on the Weather" in the *Companion to the Almanac*, published by the Society for the Diffusion of Useful Knowledge, are obscurely written. In one place (p. 17.) it is stated that, by some philosophers, the increase of the weight of the air has been supposed to proceed from the quantity of water dissolved in it; "but this is refuted by the simple fact, that when the barometer stands highest, the air is most dry." Now, had this sentence been written, *when the barometer stands highest, the air is most drying*, it would have been equally intelligible, and, I will venture to say, more consistent with fact. In p. 19., in describing the indications of the hygrometer, it is said, that "a rise in the dew-point, accompanied by a fall of the barometer, is an infallible indication that the whole mass of the air is becoming imbued with moisture, and copious precipitations may be looked for." Unluckily for the novice in such matters, it is not added whence this copious precipitation is supplied; and if such indications follow a period of fine weather, as they necessarily do, the puzzle is still greater. I regret to observe, too, in a paper "on the atmosphere," in a late number of a celebrated agricultural work, that effects are attributed to assumed causes, not at all creditable to the writer as a meteorologist.

Your correspondent, I hope, will excuse my proposing this subject to his attention: he appears to think for himself, and I trust he will oblige your readers with his ideas on it. — *J. Main. Chelsea, May* 7. 1829.

Why Silks and Flannels are apt to emit Sparks in Frosty Weather, &c. (p. 200.) — I am not aware that *silk* is more easily excited, so as to produce electrical phenomena, in frosty weather, *than any other electric*. It is well known that air is a very imperfect conductor when *dry;* but the electric fluid is readily transmitted through *moist* air. In frosty weather, when the air is dry, it becomes, as it were, an insulator round the silk or other electric. Hence the electric fluid, being confined to and round the surface of the excited body, exhibits the phenomena of light, attraction, and that phenomenon which has generally been termed repulsion. M. expresses a wish that some of your correspondents would send a communication, for insertion in your Magazine, upon the subject of electricity. If consistent with your plan, I shall be happy, as far as I am able, to comply with his request. — *A. L. A. Alnwick, April* 7. 1830.

The subject of electricity we would rather decline, as it belongs more to natural philosophy than to natural history. — *Cond.*

THE MAGAZINE

OF

NATURAL HISTORY.

NOVEMBER, 1830.

Art. I. *Original Letters, descriptive of a Natural History Tour in North America.* By T. W.

Sir,

I am in possession of a series of *original letters*, with descriptive *drawings*, written during a perambulation of eight months, in the summer of 1823, through one of the most interesting parts of North America; and, as they extend to subjects of natural history, they are at your service. I cannot boast of their style, but they are juvenile productions, and my first attempt at journalising. Young as I was, I could not pass over an interesting country without committing a few observations to paper; hoping thereby not only to be instructed, but to be amused at another period with recollections of the scenery of the wilderness.

The descriptive part, always the most difficult, is below what I could wish: the mind, like the body, when wearied by exertion, will relax; and the fatigue of travelling alone, on foot, under a vertical sun, and generally over a rugged, trackless, and mountainous country, will frequently subdue the fervency of the soul, and render it dull and listless.

The drawings which may be occasionally offered are intended to display the landscape, particularly that of the high lands on the Hudson River, the most interesting spots on the Grand Western Canal, some of the great lakes of North America, and the Cataract of Niagara from five different positions; also, some of the most remarkable plants, fossils, animals, birds, fishes, reptiles, and insects, which came under the writer's observations.

I have endeavoured to communicate facts without the aid of fiction, and flatter myself that what I have collected, where abundance might have been gathered, will be worthy of no-with personal adventure.

These letters were formerly addressed to a female friend, and will be transcribed now, as they were then sent, from my note-book. I am, Sir, &c.

Liverpool, Sept. 1829. T. W.

LETTER I.

My dear B. — It is just a month short of four years since I arrived in New York. But of this beautiful city, and very flourishing sea-port, I have already communicated every thing which I believed would interest you; and hence one of my motives for leaving it: in my peregrinations farther I may, perhaps, again collect something for your amusement and instruction. You know I had always a strong inclination to ramble; and your remonstrances have more than once laid waste my plans. When I informed you of my idea of taking a transatlantic trip, you thought it would be a wild-goose adventure; and that in the end, if I tried the experiment, I would be miserably disappointed in my expectations. I did not, however, go abroad with more anticipation of enjoyment than what would render time agreeable; and disappointments in affairs which could not mar my happiness, nor defeat the object of my sojournment, were considerations of no moment to dwell upon. But you thought it no crime to laugh at my *ideal* philosophy, as you termed it; and sought to repress it by representations of danger, the endurance of constant and excessive fatigue, and every species of deprivation, without the possibility of reaping adequate advantage, or the expectation of any real benefit.

Men's minds are unlike other productions; to wit, the vegetable kingdom, which makes the most luxuriant growth, and finest display of its colours and natural beauties, in an indigenous soil. The germ of genius may be warmed, and even the scion nursed, where it first sprang; but the beauty by which its maturity is to be illumined, and the extent of its intellectual exhibitions, will materially depend on its being lopped by society, and subjected for a season to the keen edge of the world's pruning-knife.

> "When lopp'd and pruned, trees do flourish fair."

I pray you not to understand by this that I hold all men to be fools who have not travelled into other climes; that, indeed, would be going into the opposite extreme: yet the case is sometimes even so; for

With eyes that hardly served at most
To guard their master 'gainst a post,
Yet round the world the blade has been,
To see whatever could be seen."

And I am aware you once witnessed an instance where travelling appeared rather to have made the person "lisp, wear strange suits, and disabled him from receiving the benefits of his own country." You have seen a fop "grown so fast as e'er he could" from the day he commenced his foreign visits; but, my young friend, if I thought myself destined to become such a creature, or that you think me a likely subject to be thus influenced, and that my travelling is not a matter of need, I would immediately turn my unfortunate footsteps homeward, and for ever afterwards confine them to the purlieus of my father's inheritance, or the precincts of the good sabbath-day's walk of old. Dr. Watts, you may recollect, says, "Nothing tends so much to enlarge the mind as travelling; that is, making a visit to other towns, cities, or countries, besides those in which we were born and educated."

Shakspeare, in relation to the same subject, speaks thus:—

"Let him spend his time no more at home,
Which would be great impeachment to his age,
In having known no travel in his youth."

The father of English philosophy, Bacon, observes: "Travel in the younger sort is a part of education; in the elder, a part of experience." Addison remarks, that "a man not enlightened by travel or reflection grows as fond of arbitrary power, to which he hath been used, as of barren countries, in which he has been born and bred." To urge my theme further would be impeaching your taste and judgment.

I am now on my passage up the Hudson River, on board the packet-sloop Neptune. We have a fair and rather brisk wind, with every appearance of a thunder storm.

The Hudson, or North River, as it is here more generally called, between the ferries of New York and New Jersey, is one mile in breadth; but the quays, and other contrivances of man, have evidently encroached upon the natural boundaries of the water, as the river abruptly expands immediately above and below the city. For some distance up, this river forms the line of division between the States of New York and New Jersey. The shore and land on the Jersey side, directly opposite New York, affords only an indifferent landscape, having little else to attract the eye than a few houses scattered here and there on some sand hills: a tree or vegetation of any gay city, across the Hudson, is constant, and attended with that convenience and facility which characterise the operations of this people. Two, or sometimes more, steam-boats are usually attached to each ferry; and, from sunrise to long after sunset of each day, they are busily employed in transporting passengers, carriages, cattle, and various kinds of goods, to and from market. The ferry-stands are, in fact, drawbridges, regulated to suit the rise and fall of the tide: thus the ingress and egress into and out of the boats become at once both safe and easy. Numerous sloops, schooners, and various other descriptions of smaller craft, are constantly seen on the Hudson; and when viewed from an elevation, silently and leisurely winding their way among the verdured hills, sails white and spread, the effect is very interesting, and always forms one of the best embellishments to a land scene. The vessels designed for passengers are finished in an elegant style; their cabins are comfortable, capacious, and convenient, and decorated with the richest drapery. In beauty of form and general appearance, certainly, they excel any packet vessels I have ever seen in Europe. On the water they are easy and light, and, with a moderate wind, sail with astonishing rapidity. Albany is distant from New York 160 miles, and one of these vessels (a sloop) has, a few days ago, made this distance in 13 hours. In burthen, the sloops and schooners will average from about 30 to 150 tons, and in number they have been calculated to be upwards of 1500.

Here are, besides, four steam-boats which ply up the Hudson from New York to Albany, calling at the intermediate towns and villages on their way, as the wants of the passengers may require; and, for beauty, size, and despatch, they excel any I have seen or heard of in any part of the world: those of the Thames, Clyde, or Mersey, would cut a pitiful figure alongside of them. In burthen they are from 500 to 700 tons, and have occasionally accommodated from 150 to 200 passengers with beds. These cabins extend nearly fore and aft, and are so lofty as to contain three and even four tiers of beds: a spectator at his entrance, struck with the magnificence of these apartments, is apt to imagine himself in the mansion of some nobleman. Splendid cabins, however, form not their only recommendation: one of those steamers, the James Kent, a new vessel, and in

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* Since the above was written, the prospect here alluded to has undergone much improvement. Powle's Hook (the name given to the ferry and shore on the Jersey side, immediately opposite to the city of New York) now displays many large and elegant houses, gardens, and plantations.

performed her trip from Albany to New York in the short time of 12 hours, which is at the rate of 13 miles to the hour; both wind and tide, of course, were in her favour. *

Steam-boats were unknown on this Continent before the time of Robert Fulton; indeed, it is a common opinion of the Americans, who are conspicuously tenacious of the rights of their citizens, that he not only introduced them here, but also was the first to apply steam for maritime purposes. This, however, is pretty certain, that the ardour and speculation of steam navigation arose in a great measure from his genius and enterprise; and, if he were not the inventor (the question is now pretty well settled in favour of Mr. Henry Bell, a Scotchman), his name will ever be associated with the honour of this great discovery.

As I do not intend to trouble you often with double postage, I shall reserve for another letter what I had contemplated should be in this. In my next I shall give you a sketch of the western or Jersey side of the river, which, I flatter myself, will contain some interesting particulars.

I have the honour to be yours, most faithfully,

Hudson River, *May*, 1823. T. W.

Letter II.

My dear B. — The clock of St. John's could be faintly heard: we were just escaping from the smoke and noise of the city, and cutting the waters of this majestic river, as it was striking the hour of six in the evening. The clouds were seen in tumult, rapidly rolling from the west into dark masses, which hung, in awful confusion, above us; thunder was heard at a distance; and the lightning's flash flew fierce and frequent through the atmosphere: every body on board was convinced the evening foreboded a stormy night, and some of our passengers, who had collected themselves into groups upon deck, appeared evidently alarmed. The stories of wrecks, and of lives that perished near this place, were once more brought back to the memory. On our weather quarter I perceived an old woman, with grave and solemn cast, in the act of repeating some disastrous tale. I approached nearer, and found her engaging her hearers, whose minds no doubt were now well prepared for the reception of sad and mournful story, with an account of a sloop, which, during a late storm, was upset, and all hands perished. A calm spectator would have found no difficulty in discriminating the character of many on this occasion. The captain, whose bold, placid, determined look, broad shoulders, and masculine figure, indicated any thing but fear, was solicited to run back into port: he was not, however, to be daunted with a black cloud, the pealings of thunder, or signs of a gale, and *guessed* we should be in Newburgh by daybreak.

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* This distance, although the above is certainly very fast sailing, and, I might add, unprecedented in this country, has been lately done in ten hours by a steam-boat called "The North America."

At 10 P.M. the wind had risen almost to a hurricane, and veered unpropitiously to the north; the thunder and lightning were tremendous, and the rain fell in torrents. We were now making a great deal of lee-way, and instead of reaching Newburgh at daybreak, as our worthy captain had guessed, we were driven back to within a few miles of New York. Contrary to the feelings of many of my fellow-passengers, I was not sorry at this circumstance; the bustle and confusion of last evening had rendered it difficult to collect any information, or sketch the romantic scenery which the shore of this place presented, and which I was so anxious to obtain.

The following, though a rough picture (*fig.* 124.), will, however, convey to you a better idea of this place than any thing I should be able to add in any other way.

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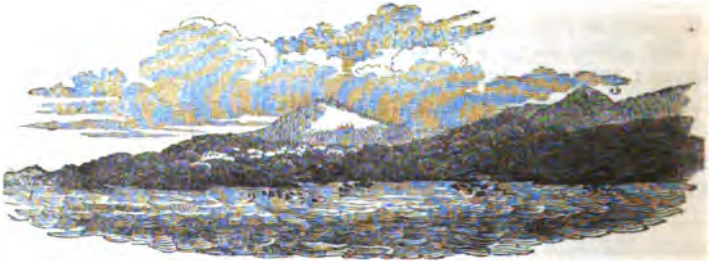

Near the place marked 1 is Hoboken Ferry, the duelling ground, and the monument of General Hamilton. At 2 are found in a state of great purity the hydrate and carbonate of magnesia in secondary limestone, and in connection with rich veins of serpentine and soapstone, or talcose rock, about 15 ft. or 20 ft. below the surface. Native magnesia also occurs on Staten Island, in the bay of, and about fifteen miles from, New York. But what makes this place still more interesting to the naturalist, beautiful specimens of amianthus, and other varieties of asbestos, traverse in interrupted veins the serpentine stratum. 3, the Bluffs of Weehawk, and the commencement of what is called the Palisado Ridge. This ridge extends about forty miles north on the west side of the river, columnar masses, occurring sometimes, as I observed, in the form of regular hexagons. The ridge, at its highest elevation, will be from 500 to 600 ft. above the level of the river.

The morning was quite clear; all was calm, the tumult of the heavens had ceased; not a cloud was to be seen; the wind, although light, was very favourable; and we were wafted slowly along the rugged and truly romantic shore of Weehawk. The mountains, bluffs, rocks, glens, and deep ravines which here present themselves after so short a sail from all the pomp and splendour of art, form a contrast, on which the mind will be apt to reflect.

At a short distance from the upper ferry, called Hoboken, just before you approach the acclivities of Weehawk, stands, near the shore, the monument of the once brave and patriotic Hamilton: it is seen like a small steeple, peeping from amidst the thick wood that surrounds it; and, as though ashamed of the spot where was shed the noble blood of this hero, it is content to perpetuate the name of a man once adorned with the laurels of fame, great, good, and talented, amidst wild woods, and in the gloom of nature's rudest productions. Hamilton was a brave and distinguished general in the revolutionary war, and merited the long life and exemplary death of a virtuous man; but coming in contact with some of the political views of the ambitious, wily, subjected [?], and equally talented Colonel B., he accepted his challenge, was shot, and buried where now stands this monument. This place, ever since his death, has been selected for duelling-ground. It is a circular hollow, of perhaps one hundred yards in circumference, and completely surrounded by interrupted and irregular masses of rocks, bushes, and trees, on many of whose trunks may be seen the marks of bullets. Two or three instances of *honourable* meetings have lately occurred at this place. "O tempora! O mores!"

The country on the New York, or eastern, side of the river, extends from two to fifteen miles up the Hudson, without almost any perceptible elevation, and is agreeably variegated with patches of woodland, fields apparently in fine cultivation, farm-houses, cottages, and villas. Houses in the country, as in the cities and towns of America, are mostly constructed of wood, and generally well coated with white paint. What is called the Promontory of Weehawk is somewhat more than a mile from Hamilton's monument: it commands an excellent view of the harbour and city of New York, Long Island, Staten Island, and the ocean, with various other objects of diately comes in contact with high and seemingly interminable ridges, whose surfaces, covered with dense wood, are broken down here and there with dark and dismal clefts and ravines, and rocks piled and wedged into one another, forming stupendous and awful precipices. In passing up the river, in front of this "wild and savage scenery," I could discover a few huts scattered in places close upon its brink, which were inhabited, as the smoke indicated, by human beings. How these people had become attached to, and what could have induced them to settle at the foot of, this craggy and mountainous district, I could not surmise. I enquired of one of my fellow-passengers, whose communications and inquisitiveness had already brought us into easy conversation, who and what these people were? He informed me they were woodmen, or choppers, and made chopping their chief employment; that they were, he *reckoned*, very happy, and, for the most, made a smart living. You must understand by choppers, men who, in the autumn and winter, hew down the timber of the forest, cut it into certain convenient lengths, and afterwards make it into piles, which, when dry, they sell by the chord to proprietors of lumber-yards in New York. The lumber merchants, as they are called, retail it to the inhabitants for common fuel. Fuel, in the large towns of America, is a very expensive article; a carman's load of fire-wood, perhaps not more than half a ton, is sold at usually from fifteen shillings to a guinea, and frequently at much more. Coals (not burnt by one family in fifty), imported from England, bring from 2*l.* 10*s.* to 3*l.* 10*s.* per chaldron, or thirty-six bushels.

I am yours, most sincerely,

Hudson River, *May*, 1823. T. W.

ART. II. *Notes on the Pyrenees.* By WILLIAM AINSWORTH, Esq., Member of the Royal College of Surgeons of Edinburgh, &c.

THE chain of the Pyrenees apparently extends itself from the ocean to the Mediterranean, in a direction which seldom deviates from the shortest line. The isolation may be considered as perfect on the north; the extensive and fertile valley, commencing beyond Toulouse, and terminating in the Mediterranean, marked by the course of the canal of Languedoc, and comprising in its line the towns of Villefranche, Castelnaudary, Carcassonne, and Narbonne, forms a complete barrier to the too general views of those who suppose a junction of the Pyrenees, whether with the Alps or the Cevennes, through the medium of the "montagne noire." To the south we have not had sufficient opportunities of observation to give any determinate opinion. M. Charpentier states that it is continued as far as Cape Ortegal, in Galicia. The limits may be considered as marked in the north by the superposition of the tertiary formations; to the south they have not been determined. Its length, as extending only from ocean to sea, does not exceed five degrees of longitude; its breadth varying throughout with the extent of the transverse chains. The quantity of surface which it may be supposed to occupy has been estimated at 198 square leagues. In its central part, a solution of immediate continuity takes place, and a divergence from a straight line; its western acclivity receding 1600 toises to the south, but in the same direction as the eastern acclivity. The general direction of the chain, with respect to the meridian, is constantly from east-south-east to west-south-west, and that of the strata is most generally the same. In investigating their structure, the Pyrenees appear to consist of a series of bands of alpine limestone, old red sandstone, and transition rocks, reposing alternately on mica slate, or granite, or a mass of intermediary rocks, locked here and there in stratified crystalline beds. The gneiss and mica slate, generally feldspathic, are, on the one hand, so intimately connected with the transition series, that Amé Boué did not think that their separation was possible; while their intimate relation with the crystalline deposits, and the accidents of the latter, led him to suspect that these were most probably of a date posterior to that of gneiss. M. Charpentier, considering the crystalline primitive rocks to join the base of the chain, supposes a gradation as marked by the succession of primitive, transition, and secondary rocks; and, to account for their degradation and frequent absence on the Spanish side, gives an ancient hypothetical section, by which the culminating point of the crystalline mass being carried away with the other formations to the south, leaves the transition and secondary rocks predominating on the chain.

The crystalline rocks never attain in the east an elevation equal to 1500 toises; while the transition series, succeeding immediately in the continuation of the crest, rise to an elevation exceeding that sum, and continue, without interruption, to the Port de Glare, where the former again form the crest of the chain. The elevation of the latter is here at its maximum; but the culminating point of the Pyrenees, ascertained by the geodesical operations of MM. Reboul and Vidal to be not the Mont Perdu, but the easterly peak of the Maladetta, known under the name of Pic d'Anethou. This latter does not form part of the crest of the principal chain, but is situated at the origin of a valley.

Coursing to the west-north-west, the crest leaves the culminating point of Mont Perdu to the south, and the Pic du midi d'Assau, Neouvielle, and Vigne Mali to the north, presenting at the appearance of the overlying alpine limestone accidents which give rise to the most striking and beautiful scenery. Beyond the Pic du midi d'Assau, the transition rocks are succeeded by the old red sandstone, which, alternating for short spaces with the former, continues to nearly the western oceanic extremity of the chain. The crystalline rocks are not thus found constituting the greater portion of the crest, nor do they in those points attain an elevation much exceeding that of the transition or secondary series. The alpine limestone in the north-east of the chain constitutes a series of parallel chains, continued to the Montagne de Corbières, where it is succeeded by clay slate and greywacke, by which the crest is continued; while it forms a series of transverse chains, met with again lying at the extremities of the transition rocks; the band of the latter reposing on granite mountains reappears on the other side, to form the crest of the principal chain. By this disposition, the Pyrenees represent in their eastern portion three different chains, in which the band of transition rocks, forming the line of the principal crest, predominates over the crystalline series, lying at some distance to the north-east, or in the direction from which the waters should have effected the degradation of the first series.

In all cases, if we proceed by describing the variety in constitution, or of combination, in each separate protuberance, to give an idea of the geognostic stratum of a chain of hills or mountains, we shall arrive at but an imperfect notion, even when accompanied with the most minute details. Taking, however, in view the physical character of the range, with the general principles of its internal constitution, we can, by tracing the elements of the disposition and accidents of the former, in the deposition and developement of its mineral constituents, ally in our description phenomena which are never separated in nature, and deduce some general notions on the origin of the mineral masses. For the variety which the same mineral constituents are capable of assuming in their combination, renders it both a tedious and useless task to pursue such investigations to their ultimate point: but the disposition which the same minerals assume with respect to their geognostic superpositions, or to their geographical distribution, is of the utmost importance in deductions from the physical characters of a geological tract; and, whatever may have been the agents which have produced the contrasted configurations on this tract, still the phenomena of internal structure, or the variety in external characters, will always afford physical indices of the nature of these influences, while, by a study of any one of them alone, we may be led, from the want of proper indications, into the widest field of hypothesis. The deposition of alluvial tracts by water, the piling up of mountains of sand by the winds, the formation of basaltic columns by volcanoes, the uprising of forests of islands, whose architects are minute and almost invisible, finally cementing together to form continents, are so many striking and well known features in geology; but the power that consolidated, or the hand that hewed out, the giant forms that adorn the surface of the earth has not yet been felt by man.

Besides the mountains forming the principal chain, there occur in the Pyrenees many others united by a common crest, and forming chains running sometimes in a direction perpendicular to that of the chain generally denominated transverse or divergent; others follow a course which is parallel to that of the principal crest, and are thus lateral or parallel chains. While the termination of the transverse chains generally takes place in the plains, or in the meeting of two valleys, that of the parallel or lateral chains most frequently occurs in the larger transverse valleys of the chain. The most striking differences between the structure of the transverse and principal chains in the Pyrenees occur in the Maladetta, where, while considerations founded on the phenomena of valleys, and on the physical distribution of the waters, mark the transition rocks as forming the principal crest, granitic rocks strike out in a south-westerly direction, attaining an elevation of 1787 toises.[*] The chain of Mont Perdu, perpendicular to the crest, is also transverse to the limestone chain; and thus the Ara river courses parallel to the streams supplying the Cinca river. With these two exceptions, and the ridge of alpine limestone taking its departure from Mont Aistaince (and the accidents they present mark their difference from other transverse chains), all the rest that take their departure from the principal crest are similar in structure to the rock of which they constitute branches.[†]

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[*] The French toise is, according to General Roy, equal to 1·06575 English fathom.

[†] The memoir of M. Reboul, read to the Academy of Sciences in 1788, established that the calcareous beds of the Marboré and Mont Perdu lie every where on granite or argillaceous schists, or on intermediary (transition) siliceous rocks.

At the Tour de Soube the granite, topped with alpine limestone, crops out above the transition series, attaining an elevation of 1607 toises, forming in this case the crest of the chain. The transverse chains are constituted of transition rocks, reposing on older formations. Transverse chains, of a structure similar to that of the crest at their departure, may in their course be overlaid by other rocks: thus, the mica slate overlies all the transverse chain of granite originating between the Port d'Estaubas and the Port de Clarabide, as the transition rocks overlie the mica slate a little further down the chain. As mica slate is only met with associated with granite rocks, so the primitive limestone is only seen forming detached masses on the same mountain rock, nor can its distribution be at all associated with any of the physical phenomena exhibited by the mountain chain.

No chains occur in the Pyrenees, following a direction perpendicular to the principal crest, which are not either attached to it or to other parallel chains; and we believe that this fact is applicable to mountain chains in general. We do not think that the difference of formation, or the absence of any hilly connection between two parallel chains in the immediate vicinity of one another, can satisfactorily establish their independence; but the isolation of a transverse chain would always, *à priori*, decide upon its local geographical relations, in most countries of mountains and mountain chains. There occur on the lateral limits chains of a different structure coursing parallel to the principal crest. This fact led one of the old geologists to divide geognostic formations, then mostly studied in mountain chains, into bands:. Guettard describes a sablonous band, a marly band, and a schistose or metallic band; and the Pyrenees present features very nearly allied to these views. These inlying chains are in most cases formed of rocks or deposits of a more modern formation than the principal crest, of which they are oftentimes the *débris*. Bourguet, in his *Phenomena of the Constitution of the Globe*, says, the chains extending from east to west have sometimes shells and plants on them; while their branches, extending north or south, are entirely formed of fish, shells, plants, &c.: but it is difficult to say whether he was alluding to their real direction with respect to the meridian, or to the relation of lateral and of transverse chains to one another.

In the Pyrenees parallel chains are generally of a structure different from that of the principal: they are chiefly constituted of alpine or Jura limestone, the former of which, with few exceptions, always forms hills having a similar line of direction. These exceptions occur in the chain of the Mont

Perdu, and in the Vallée d'Aure. The lateral chains formed by the transition rocks have marked peculiarities, and an independence as chains, as strongly marked by their physical characters as by their geognostic constitution: such are the chains of the Corbières de la Barguillère, Mont de Pinet, &c. The primitive crystalline rocks form several extensive lateral chains; those in the east are continued by the Pic de St. Barthelemy to the valley of Saleat, presenting in their course *cols*, or ports, as in the principal chain. The direction of the granite mountain of Irsovia Mendi, or the line of its greatest extent, is nearly parallel to that of the chain. It results from the relation of transverse and lateral chains, that chains which are transverse to the principal have others perpendicular to themselves, and generally similar in structure, which may be parallel to the principal chain, the latter generally giving rise to one rivulet or more; and the relation of the lateral to the transverse chains must be the same as that of the former to the principal, the transverse being mostly of a similar structure. It also results from this disposition, that the generality of the Pyrenean valleys, originating from the crest of the principal chain, are transverse with respect to it, but longitudinal with respect to the transverse chains, which also originate from the main crest; while the valleys dividing the mountains, and forming the line of the crest of the perpendicular chains, transverse with respect to them, are parallel with regard to the main chain, and to the valleys dividing the lateral or parallel chains. Most of the transverse valleys of the Pyrenees, as previously remarked by Ramond and Charpentier, present at their origin a vast basin, in the form of an amphitheatre, or a succession of basins, which rise one above the other; so that the valley, instead of offering a uniform slope, rises by so many stages towards the crest of the chain. This arrangement occasions the mountain torrents descending from above to form cataracts or falls; but this, as in fact the diminution in size or contraction of these basins or oules (alles): as they are termed in the language of the country, we have always observed to be connected with other geognostic changes.

The valleys which divide the parallel chains are alone truly longitudinal. They occur generally in the direction of the strata of the mountain; and the difference between the direction of the valley and that of the strata affects the formation of caverns. Charpentier has remarked, in the Pyrenees, that the entry of valleys terminating in the plain is sometimes large, sometimes narrow; but valleys terminating in another valley are almost always narrow at their origin: of which fact cause; as the junction of one valley or more generally takes place in a basin, and the extent of the latter is proportioned to the number and to the size of the outlets which terminate in it.

The sum of the maximum of elevation of the crest marked in the peaks or culminating points, and of the minimum marked by the transverse valleys and cols, ports or passages, gives the mean height of the crest chain of hills. The determination of the mean height of the line of the crest by the mean height of the cols, ports, or passes, is, even according to the Baron de Humboldt, an abstract idea, and vague when there is grouping of mountains and no continuous chain; and I think that a nearer approximation would be gained to the mean height of the crest by a comparison of the maximum and minimum of elevation of the protuberances themselves, than by a hasty calculation founded upon the height of such ridges or passes, whose depths are oftentimes connected with accidents posterior to the formation of the chain. Some countries of mountains, as the Himmaleh, are traversed by large rivers; chains (dovre-feldt, &c.) are often divided by profound rents, which are sometimes empty veins (Jameson, Von Buch); while the basin of the crest may, in other cases, be filled with deposits of the coal formation or other secondary or more modern deposits (Alps, Lebau). The data upon which the calculation of the mean height of the crest of the Pyrenees has been founded are more or less empirical; for the country of mountains known under that name consists of a series of parallel and lateral chains, from which the principal is oftentimes difficult to be distinguished. When a country of mountains, as the Grampians for example, consists not of one continuous crest, but of a series of crests, more or less parallel to one another, traversing the country at angles to the line of the direction of the chain, the data of the calculation should be founded on the mean height of the culminating points and minimum of crest in each chain, which alone can give the mean height of the whole range; and in this case the transverse or divergent chains should be entirely neglected. From the disposition of countries of mountains, and one which appears common, some apparent anomalies take place: thus, a chain that is divergent, and transverse to the chain whose crests are to give the data for the calculation of the mean height of the range, may be parallel to the line of that range which is at right angles to the principal crest. Charpentier has remarked, in the Pyrenees, that the point of departure of transverse or lateral branches from the main or from not lost in the plain, is generally a peak of considerable height.

The culminating points of lateral chains may surpass in height the elevation of the summits of the principal chain, while the mean height of the crest of the latter is greater than that of the former; as the height of the culminating points in one chain of mountains may exceed that of another, while the mean height of the crest may be greater in the latter: and this is the groundwork of the greatest difference between the Alps of Switzerland and the Pyrenean mountains.

Superiority of height of crest, as well as preeminence of summit, may also exist in parallel or in transverse chains, and not in the principal; and as a general fact, not hitherto observed, the culminating points of countries of mountains are seldom in the centre of the chain, but at the extremity, whilst, when the highest summits occur towards the centre, they almost invariably exist in small transverse branches, and sometimes between two parallel chains. It must not be confounded here that transverse chains may be parallel to one another while at right angles to the line of the crest; they are then parallel transverse chains, but not lateral, and the structure of the ridges most generally differs from that of the lateral chains. The same may be observed of the latter when opposed to the principal crest; but when the last is wanting, and the crest exists in a series of parallel ranges, the structure will be found similar, or, at least, pretty nearly of the same age.

The culminating points, or the maxima of the lines of the crests of the principal chains of mountains in Europe, in America, and in Asia, are, according to De Humboldt, as the numbers 10, 14, 18; that is to say, they follow pretty nearly a progression by differences, whose relation is one half. But in the seven chains of the Alps, the Andes, the Himmaleh, the Caucasus, the Alleghani, and the Venezuela, the relation between the mean height of the crest and the culminating points is as 1 to $1\frac{8}{10}$, or as 1 to 2.

M. Ramond had already remarked, that the crest of the Pyrenees is only a little lower than the mean height of the Alps, while that which characterises the last chain is the great relative elevation of its culminating points; that is to say, the relation of these summits to the mean height of the line of the crest. From De Humboldt's calculation, founded upon the mean height of the passes or ports, and that of the culminating points, the mean height of the line of crest is equal in the Andes to the culminating points of the Pyrenees, and in the Himmaleh to the culminating points of the Alps. From considerations founded on the same data, the relation of the mean height of minimum of crest to the culminating point would be in the Pyrenees as 1 : 1·4; in the Alps as 1 : 2; in the Andes as 1 : 1·8; in the Venezuela as 1 : 1·8; in the Caucasus as 1 : 2; in the Alleghani as 1 : 1·8; in the Himmaleh as 1 : 1·8.

Considerations founded on a physical conception of the height of chains, which will improve as the facts connected with their physical laws will be more perfectly developed, are of the highest interest to the oryctography of the earth. The graphic sections used by De Humboldt in his delineations of the Andes, by Parrat and Engelhardt in the Caucasus, by Wahlenberg in the Alps of Switzerland and the Carpathians, by Schüblers and Hoffmann in France, by D'Œynhausen and Deehen in the Capitania de Minas Geraes, by D'Eschwege in the plains of Mysore and the gates of Malabar, and by the engineering officers attached to the survey of Major Lambton in India, and which are founded on simple barometric or geodesical operations, have been of much utility in obtaining conclusions of this nature. The Marquis La Place, led to consider that the surface of the earth, when liquid, would be pretty nearly in a state of equilibrium, from the harmony which experiments on the pendulum offer with the results given by the mensuration of terrestrial degrees and with the lunar inequalities, remarks, that as it would follow from this agreement that the mean depths of the sea might be of the same nature as the height of continents and islands, it must be evident that the mean height bears little connection with the culminating points of mountain chains, while the mean height of the crests forms an indispensable accessary to the evaluation; and, as De Humboldt has remarked at greater length, the chains and mountains which attract the curiosity of the vulgar have much less importance in such considerations than the vast plateaux, and undulating plains, and alternating slopes, which influence, by their extent and their mass, the position of the mean surface; that is to say, upon the height of a plane so placed, that the sum of the positive ordinates are equal to the sum of the negative ordinates.

There are other more or less important phenomena attached to the geography of mountain chains, and among these their external aspect and outline form interesting features, when from the ramparts of Montauban we first command that vale, or rather plain, which extends on one side to the sea, and in front to the Pyrenees. Then opens to our eyes a prospect of an oceanic vastness, in which the eye loses itself; an almost boundless scene of cultivation, an animated but confused mass of infinitely varied parts, melting gradually into the distant obscure from which emerges the amazing frame of the Pyrenees, rearing their silver heads far above the clouds, their towering masses heaped one upon another in a stupendous manner, and covered with snow, offering a variety of lights and shades, from their indented forms, and the immensity of their projections. One of the first phenomena which strike the observer on approaching a mountain chain, is the line of demarcation with the plain below; and thus we find the Pyrenees bordered on the north by an immense plain, while, to the south, transverse chains, succeeded by isolated rocks, advance far into the kingdom of Spain. The plains of Lombardy stretch to the very foot of the Alps, forming a well marked line at the base of the mountains: the same occurs in the plains of Tartary, attaining, according to some, an elevation of about 3000 yards above the level of the sea; a calculation, however, far surpassed by Barrow. The extent of the base is found to vary in different formations; but, as a general fact, mountains which do not form a part of the chain, or that are more or less isolated, have the most extended base. Almost all the accidents presented in the phenomena of the mountain chains of the Pyrenees, whether in their grouping, their alegnation, their departition *, their approximation, the regularity of acclivity, the uniformity of height, the form of their summits, or in the general accidents which accompany these, are attached to similar circumstances. Leaving the extensive lands to the north-west, the chain is approached, after crossing the Adour, through a country of hills of alpine limestone; their height is insignificant, their summits rounded, and their acclivities, as their valleys, clothed with luxuriant crops, or the scattered huts of the Basques. The granite mountain of Irsovia Mendi presents itself at the foot of the Pyrenees, but its summit is rounded. Several hills of old red sandstone are traversed near St. Jean pied de Port, without any difference in outline being perceptible. From the latter town there is a road traversing the chain; another recedes north-easterly round a long transverse ridge of transition rocks, from whose rugged heights are again perceptible the snow-topped mountains of secondary rocks, which constitute the principal crest in this part of the chain. The green-

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* The study of physical geography is yet so novel, that we have been obliged to adopt terms scarcely yet in general use.

sward crowning the outlying hills effects a gradation with the plains below, the dark tint of the bare rock on the acclivities diminishes the intensity of the shades, while the eternal snows lose their lofty summits in the passing clouds.

The disposition generally assumed by the alpine limestone is that of gentle slopes in the direction of its inclination, with bleak precipices on the opposite side, continued oftentimes for a great distance in the line of the direction of the strata; in the pass between Simoux and Alet, in the Eastern Pyrenees, the strata descend in a line parallel to the perpendicular aspect to the banks of the river Aude. The transition rocks present sometimes the same features, particularly in the mountains of the Corbières: in the latter chain, above the town of St. Paul, the uniformity of disposition is broken by a shift allowing a passage through the chain. The valley of the Corbières is reached from Mirepoix through a glen, in which the road descends for more than a league at a considerable angle of inclination; it is rendered safer by piled walls of stones. Huge precipices are seen below, and one or two caverns are met with in the ascent, from which we drove numerous pipistrelles, notwithstanding the proofs of fires having lately illumined their dark gloom. The great valley, terminating in the horizon's brink, feeding for many miles no stream of magnitude, clothed with alternate fields of vines *, maize, and olives, presents all the characters of a plain; while, on both sides, the chains, presenting a bare perpendicular acclivity, descend into the vale beneath (a fact long ago generalised by Bougues), or rear aloft their bare foreheads in aged majesty. Goats are here the companions of the raven or the eagle; while oftentimes the bay of the shepherd's dog, disturbing the wolf from his brake, is heard in the distant mountains, at whose foot man appears a rightly diminutive thing.

Mountains which have not an abrupt acclivity towards the valley which they border seldom present a uniform slope from their base to their summit, being generally interrupted by plateaux or escarpments, which sometimes correspond with those of an opposite side.

The transition rocks, tame in their outline near the limits of the chain, become more and more bold as they approach the central districts, where they cannot be distinguished in their external aspect from the rocks constituting the remainder of the crest. In the disposition of the granitic blocks, vertically placed on almost all the peaks formed of that moun-

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* It is the vale that furnishes the greater part of the excellent Roussillon wine.

the stratification of that rock. The same disposition may be observed in the mountains formed of old red sandstone in the vicinity of Alet, &c.

It is almost needless to mention how much the external aspect of the mountains varies between the lateral and the principal chains: the latter present everywhere bold yet beautiful features, the tints of a Guido with the colouring of a Raphael. They are nowhere more striking in their outline than in the central part of the chain. To him who has visited the Pyrenees, the names of the Port de Benasque d'Or, and the Col de Moines, recal scenes of irregular beauty and wildness equalled in few parts of the world.

It is of Tavernie that the French say, "Il nous faudroit ici Buffon pour la décrire, et Delille pour la chanter." *

The eloquent and lamented Ramond, speaking of the Breach of Roland, says, "Figure to yourself a wall of rocks from three to six hundred feet high, elevated between France and Spain, and physically separating them: suppose, again, this wall curved in the form of a crescent, with its convexity towards France: and finally imagine that, in the very centre, Roland himself, mounted on his war-horse, wished to force a passage; and that, with a single blow of his famous sword, he made a breach of three hundred feet in width, and you will have an idea of what the mountaineer calls *La Brèche de Roland.*"

ART. III. *Certain Effects attending the Blowing up of Stobs's Powder Mill in Peebleshire, and other Matters.* By AGRONOME.

Sir,

As you have thought well to treat your readers with my live toad and dead cockle, it is but natural that I should endeavour to find you something better by way of second course. I think I may as well go a hunting and fishing for articles in the same track which I pursued in my youth, from the days of my flaxen hair to the days of my hoary hairs and bald pate. This, I think, will be my most natural track, as I can take up every thing in succession worth noting down; or rather, in sportsman's phrase, "worth bagging or basketing." But though I may esteem "all fish that comes in the net," you are quite at liberty to pick and cull as you think proper. You heard of me last at Middleton limekilns, breaking stones and picking up petrifactions of various kinds: you must now follow me a little further north, to Stobs's Powder Mill.

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* "It would require Buffon to describe it, and Delille to sing it."

It was no powder mill when first I knew it, but a barley mill; it has, however, been a celebrated powder manufactory for the last thirty years. I could give you many accounts of the many explosions of these powder mills, and of the many deaths occasioned by them; but this would not properly belong to natural history, as the deaths were any thing but natural deaths, else I "could some tales unfold would harrow up thy soul:" such as Mr. Hunter, one of the proprietors, being struck by a stone on the shoulder, which carried off his naked arm to a great distance, without shattering the sleeve of his coat much; and how his arm was not missed till he was carried into his house, set in his chair, and his friends endeavouring to bathe his face and hands in cold water! And how another man was burnt so that he kept begging his friends to unbutton his clothes for hours after there were neither clothes nor skin on him; and how he lived from eight o'clock in the morning till six in the evening, in this state, before he died! And how his companion was blown into so many pieces that his heart and liver were found in different fields! — his tongue was found on a door-step some distance from the other fragments of his head! This was looked upon by some as a summary punishment for profane swearing, as that unfortunate tongue had been much addicted to such abomination: for my own part, I cannot see that the tongue was any more unfortunate or severely punished than the other parts of his body. But all this, as I said before, has nothing to do with natural history, only it may serve as a prelude to what I may suggest respecting the geology of the earth; and I must join with Shakspeare's fop, and say,

> ——— "It is a pity, so it is,
> That villanous saltpetre should be digg'd
> Out of the bowels of the harmless earth," &c.

But I am going to infer that the bowels of the earth may not be so harmless as it is generally supposed; for accumulations of this same villanous saltpetre may, by a natural process of chemistry, at certain ages of the earth, explode, and shatter the whole or a part of this globe, and thereby produce the various phenomena of geology which so much puzzle us poor sand-blind mortals. Nevertheless, this supposition does not answer all my notions for the phenomena of geology. We must know that there are myriads of globes in the universe besides ours; some of them may be more overcharged with saltpetre, or even with far stronger combustibles, which, bursting, may strike this globe as the stone did Mr. Hunter. Or suppose that the Ruler of the universe occasionally sends us a cannon-ball about the shape and size of a comet: whether such ball be composed of fire, or water, or cast iron, or larger or smaller than the earth; or whether with the velocity of lightning or the tardiness of a stream of water; or whether such ball be sent by the power of gunpowder or steam, or electricity, or what is most consistent with all his works — some clockwork machinery, still the effect must be in proportion to the cause. And that this globe has suffered many such *blows-up* is quite evident; and that it will undergo many more such, is quite probable: but as a thousand years are but as one day to the Eternal Being, so the times of such "wreck of nature and crush of worlds" are as much understood by us as the strikings of a clock by the fingers and figures on the dial-plate. Though the heavenly bodies are immense in magnitude as well as in number, they are not infinite in greatness, as many of them can be measured to a great nicety: and as for an infinite *number*, it is a contradiction in terms; for though the whole globe, or the whole of ten thousand globes, were composed of mustard-seeds, which are said to be "the least of all seeds," yet one seed taken from them would make the number less. But the Creator of all these globes must be infinite in greatness as well as in all his other attributes, at least as much superior to all his works as the boy is above his marbles; and though he has been pleased to let these bowls roll round in their spheres, with the greatest regularity, for the last few thousands of years, yet these may appear as only a few moments to Him who is eternal; and there can be nothing to hinder Him, at any time, from picking up any one of such bowls and shooting it at any one of the others; nay, very likely, some globe or other is already on its journey towards our globe, and may shatter it in the manner that the poor powder-maker was shattered; or it may only burn it, as his companion was burnt.

No doubt you will say that I am got a long way out of my depth: I grant it, but I care for no depth in either salt water or fresh. I am very fond of swimming; wherefore, then, should my spirit be confined to grovel among the clouds, only a few hundreds of yards above this dirty globe, not fairly out of the stench of it? No, no, Sir; my soul shall magnify the Lord of all worlds, of all systems; I will proclaim Him a *great* God, and a great King above all gods. I am no atheist nor blasphemer: those who worship little gods in the likeness of men, or lambs, or pigeons, are the greatest blasphemers, atheists, and idolaters in the world.

I hope your Magazine of Natural History will make us acquainted with a system of nature much superior to that which has been handed down to us from the barbarous ages, viz. that there is but one earth, a four-cornered platform; and one heaven, an arch over it; and that the stars were so many brass or silver nails driven into the ceiling; and that some day soon they would fall out upon the earth, like apples from a tree in a whirlwind! Truly, Sir, such doctrine is more ridiculous than that of the old woman who said she looked upon the stars as so many *holes* which let through the light of heaven! We have been pestered lately with new theories of the earth, and new systems of geology; and if the above only add one to the number, it will be that of your sincere friend.

Some people take a pride in boasting of their great achievements, such as killing dragons, like St. George; or dun cows, like Guy of Warwick; or fighting with bears, lions, unicorns, or alligators; but the only achievement of this kind which ever I performed was swimming into a fish-pond, skirted with reeds, and grasping by the neck a large snake, 3 ft. 4 in. long. I brought him alive to land, and made him disgorge two full-grown toads, one of which I had just seen him swallow; the other was three parts decomposed, or little more than the bones and skin. I was but young then; I wore the skin of the snake as a hatband for several weeks; and I kept its oil in a bottle for several years, with the notion of curing disorders, burns, scalds, and the bites and stings of reptiles, as I had been taught by the old women in our country.

I remain, Sir, yours, &c.

Stowe, *May*, 1830. AGRONOME.

ART. IV. *The Cuvierian, or Natural, System of Zoology.* By B.

Essay 4. *On Mammiferous Animals; their Division into Orders, and distinctive Characters of each. Comparison between the Cuvierian and Linnean Systems.*

(*Continued from* p. 134.)

THE first of the four classes of vertebrated animals, called by Cuvier Mammiferous, by Linnæus Mammàlia, from the Latin word *mammæ*, breasts or teats, are the only animals that suckle their young; and this external character distinguishes them better than any other from the animals of the three subsequent classes. The class of mammiferous animals ought to be placed at the head of the animal kingdom, not only because it is the class to which we ourselves belong, but because it is that which possesses the most numerous faculties, the most delicate sensations, and the greatest variety of action, and in which the assemblage of all their qualities appear so combined, as to produce an intelligence more perfect, more fertile in resources, less the slave of instinct, and more capable of progressive perfection, than what is found in any of the other classes.

As the quantity of respiration in mammiferous animals is comparatively moderate, they are generally constituted for walking firmly, with a continued motion, and all the joints of their skeletons are fitted with a precision which determines the regularity of their movements. Some animals of this class, however, are able to raise themselves in the air by the aid of membranes extended on the prolongation of their members, of which the common bat furnishes a well known example. Other animals of this class have their limbs so shortened and contracted, that they can only move with ease when in water. Cetaceous animals, as whales and seals, afford instances of such a formation; but they do not on this account lose the general character of mammiferous animals.

In all animals of this class the upper jaw is fixed to the cranium, or skull; the lower is composed of only two pieces, and is articulated by a prominent joint or *condyle* (from the Greek *kondylos*, a knuckle) to the temporal bone. The neck is composed of seven vertebræ, except in one species, which has nine. The head of mammiferous animals is always articulated by two condyles to the first vertebral bone called the atlas. Their tongue is always fleshy, and attached to a bone called hyoïdes, which is composed of smaller pieces, and is suspended to the skull by ligaments. Their two lungs are divided into lobes, composed of an infinite number of cells, and are always enclosed, without adherence, in a cavity formed by the ribs and the diaphragm. Their organ of voice is always at the upper extremity of the trachea or windpipe.

Their residence, being on the surface of the earth, exposes them less to alternation of temperature than many of the animals in the other classes. Their bodies have only a light covering of hair, which is generally very thin in warm climates. Cetaceous animals, which live entirely in water, are absolutely without hair.

In all mammiferous animals, the generation is essentially viviparous; and, as before stated, they nourish their young with their milk. There has, however, been one singular anicharacters of mammiferous animals, but naturalists are not yet decided whether it be oviparous or viviparous. This animal is called by Blumenbach the Ornithorhýncus paradóxicus. Should it prove to be oviparous, it ought, says Cuvier, in some respects to be considered as forming a particular class.

In the preceding description of the distinctive characters of mammiferous animals, it has not been deemed expedient to go so fully into the anatomical details as Cuvier has done; what is here given will suffice to enable the student to distinguish the animals in the different orders of this class from those of the three other classes of vertebrated animals.

Division of the Class of Mammiferous Animals into Orders.

The characters which establish the essential distinctions between the animals of this class, are taken from the organ of feeling, and the organs of mastication. On the former depend their different degrees of ability or adroitness; the latter organs determine the nature of their food, and are not only essentially connected with their digestive functions, but with numerous consequences relating even to their intelligence.

The perfection of the organs of feeling is estimated by their number and mobility, and by the manner in which they are more or less deeply covered at their extremities with nails or hoofs.

A hoof which entirely covers the part of the toe that touches the ground, blunts the sense of feeling, and renders the foot incapable of seizing or grasping. The opposite extreme to this is where the nail forms a single lamina, only covers one side of the finger or toe, and leaves the other uncovered, possessing all the delicacy of feeling of which it is capable.

The regimen or nature of the food is determined by the form of the chewing or grinding teeth (*mâchelières*), the articulation of the jaws always depending on the form of these teeth. Animals that devour flesh require chewing-teeth that cut like a saw, and jaws restricted in their motion to opening and shutting like scissors.

In order to bruise seeds or roots, it is necessary that the crown of the grinders should be flat, and that the jaws should move horizontally; it is further requisite, that the crown of the teeth should be always uneven, like a millstone, and that the substance of which it is formed should be composed of parts differing in hardness, that one of them may wear faster than the other.

Animals with hoofs are all necessarily herbivorous, and

Animals with nails or claws are susceptible of the greatest variety of forms and regimen, and besides the different form of their grinders, they differ much from each other in the activity and delicacy of their toes or fingers. There is one character in particular which has prodigious influence on their skill and address, and multiplies their means of industry: it is the faculty of applying the thumb to the other fingers, in order to seize small objects. It is this faculty which constitutes what is properly called a hand; it is carried to the highest perfection in man, the whole fore extremity or hand being entirely free, it can be employed in grasping.

These different combinations, which strictly determine the nature of different mammiferous animals, have led to a division of them into the following orders: —

1. The first order is MAN, who, besides being exalted in all respects above other animals, has hands at the extremity of his fore limbs only; the extremities of the lower limbs support him in a vertical position. To this order Cuvier gives the name of BI'MANES (from *bis*, twice, and *manus*, a hand), or two-handed.

2. The order approaching the nearest to man in form is that of the QUADRU`MANES, or four-handed. The animals of this order have hands at the four extremities of their limbs; as the ape, monkey, &c.

3. The order of CARNASSIERS, or flesh-eaters (from *caro*, flesh, *Lat.*), has no fore thumb, opposed to the toes or fingers.*

All the above orders have three kinds of teeth, grinding or chewing teeth, canine teeth, and incisive teeth.

4. The order MARSU`PIA is so denominated from the Latin *marsupium*, a bag or purse, on account of the bag under the abdomen in which the females of this order preserve their young; as the kangaroo, opossum, &c.

5. The order RONGEURS, or GNAWERS; from the French *ronger*, to gnaw. The toes of the animals in this order differ little from those of the Carnassiers. They have no canine teeth, but have large incisive teeth in front, which serve them to gnaw their food; as in the squirrel, beaver, &c.

6. The order EDE'NTES; from the Latin *e*, without, and *dens*, a tooth. The animals of this order have no incisive teeth; their toes are very much confined, and deeply covered

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* Cuvier divides the order of Carnassiers into several families, one of which, the Carnivores, comprises all the species that devour large animals; the other families live chiefly on insects or reptiles.

by long nails, which are commonly crooked. Some animals of this order have no canine teeth, and others have no teeth whatever. The sloth, &c.

7. The order Pachyde'rmes; from the Greek *pachys*, thick, and *derma*, a skin. This order comprises all thick-skinned animals with hoofs, that do not ruminate. The elephant, horse, &c.

8. The order Rumina'ntes; from the Latin *ruminare*, to chew again. The animals of this order are distinguished by their divided hoofs; the upper jaw is without true incisive teeth; and they have four stomachs. The ox, sheep, &c.

9. The order Ce'tace'es, or Cetaceous; from the Latin *cete*, whales. The animals of this order have no hind limbs; their form, which resembles a fish, and their aquatic life, might induce us to arrange them in a separate class, if all the other parts of their economy did not agree with those of the class in which they are here placed. They are the warm-blooded fish of the ancients: to the strength of the other Mammàlia, they unite the advantage of being supported by a watery element, and we find among them the most gigantic of all animals.

It may be useful to compare the Cuvierian arrangement of mammiferous animals with the Linnean arrangement of the same class, as the latter was till very recently the received system of English naturalists. Linnæus divides the animals of this class into seven orders, the distinctive characters of which are taken almost exclusively from the number and position of the teeth. By confining himself to this one character, he has brought together in his first order animals greatly unlike in other respects, as men and bats. The generic characters in the Linnean system are also chiefly taken from the teeth. A comparison of the two systems cannot fail to convince the unprejudiced naturalist, that the Cuvierian arrangement is the most natural as well as the most scientific.

Order 1. Prima'tes; from the Latin *primus*, first or chief. Four incisive and two canine teeth above, and the same number in the lower jaws. This order includes the genera man, apes, lemurs, and bats, comprising animals which belong to three orders, as classed by Cuvier.

Order 2. Bru'ta; from the Latin *brutus*, brute, irrational. No incisive or fore teeth in either jaw. The genera in this order are the elephant, the Trichèchus, or morse, the sloth, the anteater, the Mànis, or pangolin, the *Dásypus*, or armadillo: it comprises animals belonging to three orders in the Cuvierian arrangement.

Order 3. Fe'ræ; from the Latin *ferus*, a wild beast. This order of Linnæus includes the Carnassiers of Cuvier, except

Order 4. GLI`RES; from the Latin *glis*, a dormouse. Two incisive teeth in each jaw; no canine teeth. This order is the same as the fifth, or Rongeurs of Cuvier.

Order 5. PE'CORA; from the Latin *pecus*, cattle. This order corresponds with the Ruminántes of Cuvier. No incisive teeth in the upper jaw.

Order 6. BE'LLUÆ, from the Latin *bellua*, a great beast. Obtuse incisive teeth in each jaw. This order corresponds with the Pachydérmes of Cuvier.

Order 7. CE`TE. The same as the ninth order of Cuvier.

If we regard those systems of classification as the most perfect in which objects are grouped together according to their most essential characters and resemblances, we must admit that the Cuvierian arrangement is a great improvement of the Linnean in the first four orders; but the infinite variety of nature cannot be strictly comprised in any general system; and we shall have to notice, as we proceed, that some of the genera or species in several of the orders approach so near those in other orders, as to render it doubtful where they should be placed. The next essay will contain the whole of Cuvier's interesting description of the first order — MAN.

B.

ART. V. *Description of the Great Bustard of India, with Notices of some other Indian Bustards.* By A SUBSCRIBER.

Sir,

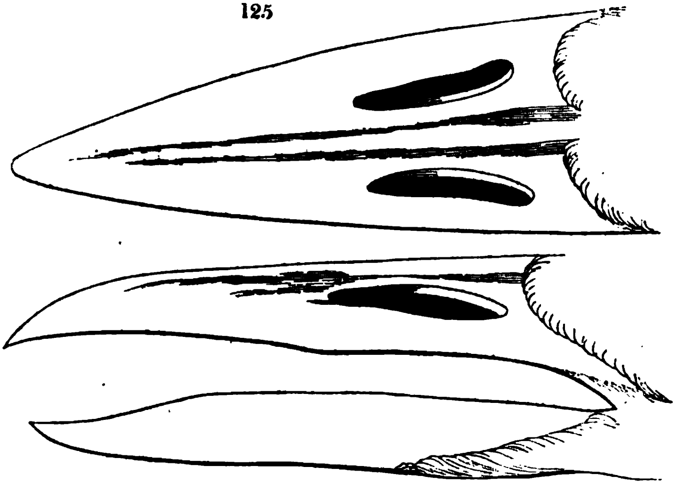
FROM there being no mention made of the Great Bustard of India in part xxi. of Griffith's *Animal Kingdom*, just published, which professes to notice "all the species hitherto named," I am inclined to believe it little known to European naturalists; a description of it may, therefore, be acceptable to your readers.

Length from bill to tail, 3 ft. 9 in.; height, 4 ft. 3 in.; breadth, 8 ft. 2 in.; weight, about 30 lbs. Bill 2¾ in. long, straight, carinated, depressed at the base, entire and bending near the tip, the ridge generally blackish, the rest greenish horn colour; nostrils elongated, almost 1 in. in length, parallel to the sides of the bill, and partly covered by a vaulted membrane; the whole bill exactly resembling that of the florican of India, and much more slender and less arched than that of the O`tis tárda in Edw. Pl. 73, 74. The iris, orange; crown, black; the feathers rather long and loose; a bare skin, of a greenish colour, extends from the angle of the mouth backward over the cheek; the rest of the head and whole of the neck white; the feathers of the cheeks, chin, and upper part of the throat and neck long and loose, giving those parts a very clumsy and swollen look, the upper part of the neck being 14 in. in circumference when measured lightly over the feathers; a dusky band across the breast; belly white, with dark streaks; vent feathers dusky; under tail-coverts mottled, greyish, white, and black. Back, shoulders, rump, and tail marked with very narrow, irregular, discontinuous, wavy lines, of light-yellowish rust colour and brown, generally transverse to the webs; the tail-feathers inclining to lead colour, with black ends and white tips. The greater quills are dusky brown; the three inner have each a white spot on the outer web, and are barred with grey on the inner; the lesser quills run gradually from dark lead colour into the mottle of the scapulars, the outer having more of the former, and the inner more of the latter; the whole are tipped with white, of a somewhat triangular shape. The scapulars are 18 in. long, reaching within 3 in. of the tip of the tail, which is about 10 in. in length. The wing is rounded, the fifth quill being the longest. The prime wing-coverts are mottled brown at the base, blackish towards the ends, with white tips, those approaching the bend of the wing have more and more black; the second and third coverts are similar, but the white spots are smaller; the bend of the wing black, with white spots; spurious wing-feathers dark lead colour, with white tips. Tibia white, 1 ft. in length, and bare 5 in. up; feet dirty yellow, tarsus 9 in. long; three toes, the middle 3 in. in length; claws broad, rounded, and concave; a large fleshy heel. The down at the base of the feathers is of the usual greyish white, and not of a pink colour, as in the florican of India and the English bustard. I know not if it is furnished with a water-bag, and I regret never having looked for it. The specimen above described was not of the largest size.

I have seen these birds in most of the high and even moderately elevated plains of Southern India, generally in pairs, and sometimes in families of four or five; but as they always keep in open ground, and are excessively wary and shy, it is no easy matter to get within shot of them. They walk fast, taking long steps, but never hurrying themselves, far less attempting to run; always taking wing when they consider themselves pursued, and rising, I think, without difficulty; but on this point I am not quite clear. Their flight is slow and steady, not unlike a heron's, the feet are drawn up under them, and they never soar; as they do not fly high, perhaps, usually, at an elevation of 100 ft., they are sometimes pursued on horseback by our sporting countrymen, and fired at with pistols. I never saw their eggs or nest.

The bustard makes an excellent dish at table, particularly a young hen; the flesh of the breast is full of triangular cavities. I add a sketch (*fig.* 125.) of the bill, of the natural size.

125



I shall venture a few remarks on the account of the bustard in the above-mentioned 21st part of Griffith's *Animal Kingdom.*

M. Cuvier's observation (p. 301.) that "they fly but little, using their wings more commonly, like the ostrich, to assist them in running," may be true enough of the European species, but is surely incorrect when generically applied. In the same page, after we are told that "the wings are short," the male O'tis tárda is said to have "the *wing-feathers* elongated, forming on each side a sort of mustachios." Surely *cheek-feathers* must be meant.

The Small Bustard of India so much prized at table, called *churj* in the Hindoostanee language, and florican by the English, is of a light ochreous colour, beautifully varied and marked above with brown and black, the down at the base of the feathers being of a pink colour; length from bill to tail, 18 in.; to claws, 22½ in., but varies much in size. The "Indian bustard (O'tis bengalénsis)" (p. 303.), is not the churj or "charge," at least, of Southern India; but, from the indistinct description, appears to be a Passurage bustard (O'tis aurìta), without the "bristles."

"Passurage Bustard (O'tis aurìta)." (p. 304.) This is the Hindoostanee *leek*, called by the English *black florican*; of which last word, or *florikin*, the *flercher* of the text is, perhaps, a misprint. The "bristles" are eight (or nine) feathers, webbed only at the tip, which spring, not from the "ears," but from the lower part of the cheek, or rather from the sides of the chin, two of them 7 or 8 in. in length, curling upward and outward, the rest shorter and only bending. The greater quills are remarkably short, and, in both this and the churj, are pointed. The down, as in the churj, is of a pink colour. These birds vary extremely in the distribution of the black, and of the white or light cream-colour on the wing-coverts and under parts, two of them being seldom found exactly alike in this respect. Length from bill to tail, 17 in.; to claws, 21¾ in.; the neck being a little shorter than that of the churj.

The Black-headed Bustard (O'tis índica) (p. 304.) must be rare, or its habitat confined. I never heard of it.

The White-chinned Bustard (O'tis índica) seems greatly to resemble the churj or florican, the chin of which is also whitish; the size, however, is not given, and it is said to have the "crown and band on sides of head black," which the churj has not. I remain, Sir, yours, &c.

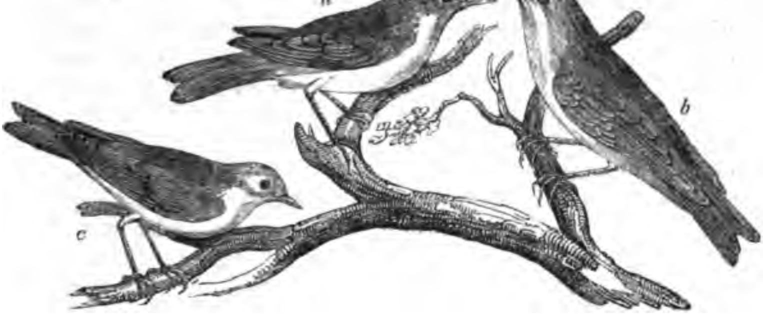
Jan. 26. 1830. A SUBSCRIBER.

ART. VI. *Some Observations on the British Willow Wrens.*

By T. F.

Sir,

THE difficulty of clearly distinguishing the willow wrens, under which general appellation I include the wood and yellow wrens, and the lesser pettychaps, though the term willow wren is very frequently applied to the yellow wren only, has induced me to bring together some practical observations, which I trust will be acceptable to many of the readers of your Magazine. I consider that there are but few naturalists who have been acquainted with the different manners and distinctive characters of the willow wrens; and of those who have published their remarks I can only safely refer to Montagu and Selby; but even their specific distinctions I have sometimes found insufficient to distinguish the yellow wren and lesser pettychaps; and I have consequently been driven to seek for more certain characters. Latham and other authors have evidently confused them. Bewick, however, in his last edition (1826), has correctly figured and described them. I shall apply the Latin names as they are now generally used, rather than puzzle my readers with new ones, although I am aware there are doubts as to their correctness.



Wood Wren (Sy'lvia Sylvi'cola). (*fig.* 126. *a.*)

Synonymes. — Wood Wren: Mont. Ornith. Dict.; Selby's Br. Ornith., pt. i. p. 188. pl. 47. f. 2. Yellow Wren, or Wood Wren: Bew. Br. Birds, ed. 1826, v. i. p. 255. Bec-fin Siffleur (Sy̆lvia sibilàtrix): Temm. Man. d'Ornith., ed. 2. p. 223.

Specific Character. — Belly and under tail-coverts pure white; closed wings reaching nearly to within half an inch of the tip of tail; first quill very short, the second a trifle longer than the fifth, third and fourth the longest, and of equal or nearly equal length; length 5¼ in.; breadth 8½ in.; weight about 5 drachms 20 grains (avoirdupois).

The wood wren may be easily known from the other two by the greater brightness of its colours, and the more distinct line over the eye. Both sexes are similar in plumage, and I believe the young to resemble their parents. The eggs are said by Montagu to be white spotted with purplish, and by Selby with purplish red; but those I have seen I should describe as white, with numerous rusty brown spots, in some the spots of a blackish brown. On account of the greater darkness of the spots, the eggs may be easily known from those of the yellow wren and lesser pettychaps. I have met with the wood wren sparingly in Kent, where it appears about the 20th of April. It is plentiful in North Wales. The habits, nest, and note of this bird, as well as of the other two, will be found correctly given by Montagu and Selby, and I shall not repeat their descriptions.

Yellow Wren (Sy'lvia Tro'chilus). (*fig.* 126. *b.*)

Synonymes.—Yellow Wren: Mont. Ornith. Dict.; Selby's Br. Ornith., pt. i. p. 189. pl. 47. f. 3. Willow Wren: Br. Zool. folio, p. 101. pl. S. f. 2.; Bew. Br. Birds, ed. 1826, v. i. p. 257. Bec-fin Pouillor; Temm. Man. d'Ornith., 2d edit. p. 224.

Specific Character. — Belly and under tail-coverts white tinged with yellow, in some birds the belly dull white; closed wings distant an inch from tip of tail; first quill very short, second of same length as, or a little longer than, the sixth, third and fourth the longest, and of equal length, only the third, fourth, and fifth quills having the outer webs sloped towards the tips; length hardly 5¼ in.; breadth 8 in.; weight about 5 drachms 12 grains.

The female is generally rather smaller than the male, and has not the plumage so bright. The young, on leaving the nest, differ from the adults in being yellower on the under parts, wings, and tail, and the bill and streak over the eye are also more yellow.

To distinguish this bird from the lesser pettychaps I found often very difficult, previously to my discovering the difference in the quills; for the variance in the plumage and legs is sometimes very trifling, having met with yellow wrens with legs nearly as dark as those of the pettychaps, and with males of the latter with a plumage quite as bright as females of the former. It is also sometimes very difficult to separate their eggs, though the spots on those of the yellow wren are generally lightest.

The yellow wren shows itself in Kent about the second week in April, and appears to be more generally dispersed through England and Wales than either of the other species. It is the only one of the three that I have ever observed to frequent gardens and orchards.

LESSER PETTYCHAPS (SY'LVIA HIPPOLA'IS). (*fig.* 126. *c.*)

Synonymes. — Lesser Pettychaps: Mont. Ornith. Dict.; Selby's Br. Birds, pt. i. p. 186. pl. 47. f. 1. Chiff-chaff: Bew. Br. Birds, ed. 1826, v. i. p. 258.

I do not refer to the Bec-fin à poitrine jaune of Temminck, believing it, from his description, particularly of the nest, to be a different bird.

Specific Character. — Belly and under tail-coverts like the yellow wren; closed wings distant about an inch from tip of tail; first quill very short, second of same length as the seventh; third, fourth, and fifth of equal length, and the longest in the wing; third, fourth, fifth, and sixth quills having their outer webs sloped towards the tips; length 4¾; breadth 7¼; weight about 4 drachms 12 grains.

The female has her colours duller than the male; while the young have them brighter. In general plumage it greatly resembles the yellow wren, but is not quite so much tinged with green above or yellow beneath. The lesser pettychaps in March, it is more numerous than the wood wren. In a short tour through North Wales I could not discover it, but frequently met with the other two species.

Bewick, in the last edition (1826) of his ingenious work on British birds, gives a figure and description of a fourth species, under the title of the least willow wren, and says that its length is scarcely 4¼ in. I have in vain endeavoured to identify this bird, and, till something further is produced, shall doubt its being distinct from the lesser pettychaps. I trust that some of the readers of this Magazine will attend to, and communicate, any facts they may discover likely to clear up this point. At the British Museum the yellow wren and lesser pettychaps do not appear to be correctly labelled; and I imagine that the bird there marked as the Sýlvia Natterèri of Temminck is only a lesser pettychaps, the shades of plumage varying according to age and sex.

T. F.

Art. VII. *Additions to the British Fauna; Class, Fishes.*

By William Yarrell, Esq. F.L.S. Z.S. &c.

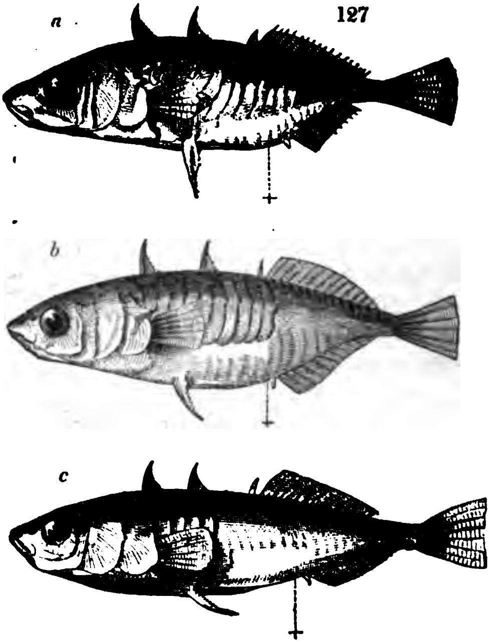
Sir,

If the following short notice prove an acceptable trifle for insertion in your Magazine, it is quite at your service. The subject suggested itself to me on reading the interesting observations of your correspondent O., in his account of the stickleback. (p. 329.)

It appears to be but little known that three distinct species of three-spined sticklebacks have been constantly confounded under the name Gasteróstеus aculeàtus of Linnæus; that all three of these species are common in our rivers, particularly the Thames, although only one of them has been included in any British Fauna.

We are indebted to Messrs. Cuvier and Valenciennes for a general description applicable to all three of these fishes in the fourth volume of the *Histoire Naturelle des Poissons*, with accurate figures of two of them. The specific distinctions of each are also pointed out; and as the old term aculeàtus applies equally to all of them, this appellation has been dropped, and new specific names attached to each, which will be mentioned in the sequel.

It is not my intention to occupy any portion of your valuable space with a repetition of that which will be found in the work before mentioned; but I send you herewith drawings of the three species, of the natural size, which, I trust, you will do me the favour to have engraved, the external characters by which they are distinguished will be found so obvious that no person need afterwards mistake them.



The line with an asterisk, descending from the abdominal edge of each fish, marks the situation of the vent.

The first species (*fig.* 127. *a*), which occurs most frequently, is the Gasteróstеus trachùrus (rough-tailed) of Messrs. Cuvier and Valenciennes. The scales on this fish extend throughout the whole length of the side, from the operculum to the origin of the caudal rays. The principal dorsal fin has nine rays, the pectoral ten, the anal seven, the caudal twelve; the principal dorsal spine long, blunt, its lateral serrations short and few in number; the ventral spine triangular at the base, the serrations on its upper edge large and not thickly set, those on the under edge small and numerous; there are two distinct rows of small teeth on the upper jaw; on the lower jaw the teeth appear irregular as to central distribution, but ending in a single narrow line at each side.

The second species (*b*) is the G. semiarmàtus of the same authors. In this fish the lateral scales extend no farther backwards than the line of the vent, and slight differences exist between this and trachùrus in the number of some of its fin rays. Dorsal ten, pectoral ten, anal nine, caudal twelve. The teeth in both jaws of this species are larger and more numerous than in the trachùrus, and not disposed in regular rows.

The third species (*c*) is the G. leiùrus (smooth-tailed) of

Cuvier and Valenciennes, in which the lateral scales extend no farther than the ends of the rays of the pectoral fin, the whole length of the posterior portion of each side being smooth and soft, without scale or fold of skin. The principal dorsal spine is smaller in this species than in either of the other two. The dorsal fin has ten rays, pectoral eleven, anal eight, caudal twelve. The general colours of all three species are green above, passing into silvery white below; but several of the specimens I have preserved in spirits exhibit various shades of crimson and purple, as mentioned by your correspondent.

Messrs. Cuvier and Valenciennes speak with less confidence of the specific distinction of the half-armed species (*b*) than of the other two (vol. iv. p. 493, 494.): but I am happy to be able, in confirmation of their views, to state, that, besides possessing examples of the three sorts from other localities, I succeeded, on different days during the month of August last, while fishing for whitebait in the Thames near Woolwich, in taking many, both young and adult, of all three species; but the first, as before stated, is by far the most common.

I am, Sir, yours, &c.

William Yarrell.

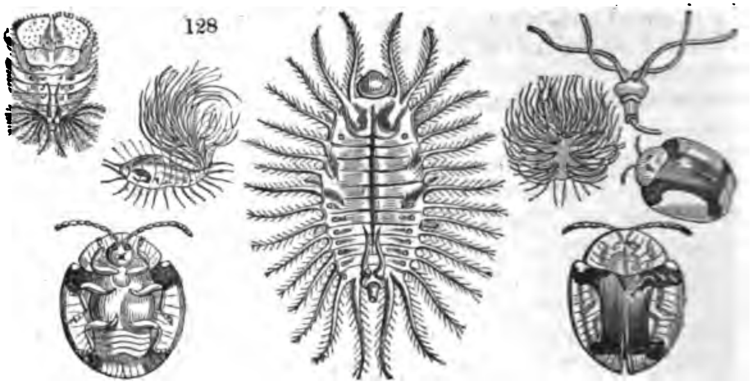
Ryder Street, St. James's, Sept. 4. 1830.

Art. VIII. *On the Metamorphosis of a Species of Cássida.* By T. H.

Sir,

I never peruse your amusing Magazine without a consciousness of my indolence in not having contributed my mite to its entertaining pages. I cannot offer you subjects of much importance, but I shall be content, if what I may present to your notice should prove acceptable and be deemed worthy of room in your publication.

The paper I have now to offer is in illustration of the metamorphosis of a species of Cássida; one, as curious as I have met with in the insect tribe. The drawing (*fig.* 128.) exhibits a species of Cássida, pretty common in the botanical garden near Calcutta; I found it abundantly spread over the foliage of a fine Convólvulus, almost to the destruction of every leaf. The larva is of an ovate form, depressed; it is in length about half an inch, and one quarter of an inch broad, very soft and tender, and so delicate in texture, that the intestines and circulation are evident with the aid of a lens. It has six short flattened legs, which are hid in the pinnated setæ



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which surround the lower margin of the abdomen. The tail, at first sight, appears to constitute a natural and inseparable part of the larva. It is, however, formed by accumulation of the fæces, which, when ejected, are received and retained on a sort of fork, springing from the apex of the body, and forming a screen over the insect during this state of its existence.

This fæcifork (to use the term that eminent entomologist Mr. Kirby would give it) is movable on the point of the anus, as on a pivot, and turns the screen it supports in any direction. If this screen or guard is broken off, another is formed in the course of a day. When the change to the pupa state is near the larvæ cease to feed, the fæcal formation is stopped, and the shaggy screen soon disappears. On the 16th of July several pupæ were completed, and on the 23d appeared the insect in its perfect form.

It is of a rounded oval figure, six lines in length, and five in breadth. The thorax and margins of the elytra are white, and so thin, that the forms of the legs are seen through them; the middle portion of the shield is brown, with broad margins of black, and the same colour extends in broad arms to the margin on each side, both above and behind; the anterior spots touch the points of the shield. A single tubercle marks the middle of the shield in front. The antennæ consist each of eleven articulations, and are subclavate; the two terminal ones are black, the rest white; the basal joint longest, the second shortest, the eleventh, or last, pointed. The under side of the body is white, the legs are white, except the tarsi, which are rufous. The eyes are black; a black spot marks the mouth, and a rufous margin surrounds it.

I am, Sir, &c.

Clapham, June 30. 1829. T. H.

ART. IX. *An Introduction to the Natural History of Molluscous Animals.* In a Series of Letters. By G. J.

Letter 6. *On the Connection between the Animal and Shell, and on their Locomotion.*

TOWARDS the conclusion of my last letter, I said that the shell was to be considered as a dead or inorganic substance; by which I meant that there was no vascular connection between it and the animal, and no internal circulation in the former by which its figure can be altered or its injuries repaired. This is admitted by all; but, notwithstanding, there are naturalists who maintain that the shell is not dead so long as it remains in connection with the living animal. Its vitality, says Dr. Fleming *, is demonstrated from the changes which it undergoes when detached: the plates of animal matter harden; the epidermis dries, cracks, and falls off; and in many cases the colours fade, or disappear. And what but vitality could have prevented these changes previously? There is, perhaps, some fallacy in the observations; for these effects of chemical and mechanical agents often begin their work before the snail's death, perhaps always, if that death has not been premature. The epidermis of old shells is worn off more or less; their colours are frequently less vivid, unless when polished or renewed by expansions of the fleshy cloak; and parts of them are almost always destroyed or worn down. If the agents act more powerfully subsequently to death, it is because they are applied in circumstances more favourable to their operation. Cuvier and Blumenbach favour the same opinion, because "the oyster and muscle adhere to the shell, not only by their muscles, but by the whole border of their cloak;" and because "the oyster has always between the two last strata of the convex valve a considerable vacuity, which is filled with a fetid acrid liquor, and which communicates with the interior of the body by a particular aperture. How," asks Cuvier, "is this vacuity produced? and, above all, how is it removed upon the formation of each new stratum, if the arterial and absorbent vessels do not penetrate into the centre of the strata, to regulate its position, and to remove, from time to time, the particles of the shell?" † In answer to this I would reply, that the connection between the shell and the cloak of the muscle, although so very close that some degree of force is requisite to separate them, is nevertheless one only of contact, as I infer from the circumstance of its being dissolved by boiling, a process not likely to destroy a vascular communication. The other fact, which, however, is anomalous, being peculiar to the oyster, I cannot explain. The cavity itself is difficult to find, and escaped my observation in some attempts made to discover it; but I am informed, by a very skilful anatomist, that it is to be found on the anterior part of the shell, at the edge. The communication between it and the body of the fish must be exceedingly minute, perhaps impervious, for no oyster-eating acquaintance of mine has any knowledge of the fetid fluid.

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* Phil. of Zoology, vol. ii. p. 405.

† Comp. Anatomy, vol. i. p. 119. trans.

I should, however, have led you into error, were you, from these remarks, to conclude that there is no closer connection between the shell and its inmate than between the mason and the house he has built. On the contrary, the connection between them is inseparable during life, but it is made merely through the medium of muscles which go from the animal to be inserted in the parietes of its dwelling. The Mollúsca of bivalved shells are in this manner attached by one or two large and powerful muscles; called, sometimes, transverse, because, passing through the body, they are inserted into both valves at opposite points; and, sometimes, adductors, because their office is to close the valves and keep them so; and the astonishing force with which they act is well illustrated by the extreme difficulty of opening those of an oyster. In simple conical univalves, as the limpet (Patélla *Lin.*), the body "is fastened to the circumference of the shell by a ring of fibres, which are attached all round the shell, and which, after piercing the outward covering or cloak, are inserted in the edges of the foot, and interlaced with its circular fibres. Anteriorly they leave a free space for the passage of the head. This muscle, by its contractions, brings the foot and the shell closer together, and compresses the body; on relaxing, it allows the shell to be raised up by the elasticity of the body." The snails of spiral shells are bound to them by two muscles, which arise from the pillar, and, having penetrated the body below its spiral part, run forward under the stomach, and spread their fibres in several slips, which interlace with those of the muscles proper to the foot, the substance of which they enter. It is obvious from this direction, that, on their contraction, the body of the snail must be drawn within the shell. When it wishes to reissue, the head and foot are forced out by circular fibres, which surround the body immediately above the foot.*

Having yoked them to their shells, I will next direct your attention to the locomotion of the various tribes; but it may be necessary, previously to entering on the details, to make a remark or two on the general structure of the moving powers. Like the muscles of superior animals, these are composed of parallel fibres, but of a bluish-white colour, soft and jelly-like, and rather loosely connected; for the cellular substance, which binds together those of red-blooded animals, is here very generally wanting. They have, apparently, no tendons, but this is, according to Cuvier, owing to the colour being the same in the tendinous and the fleshy parts. The fibres are, in general, closely and inextricably interlaced, the insertions being lost in one another, or in the skin under which they lie, and from which, indeed, it seems impossible to separate them by any definite line. Chemically they consist of fibrine, but the medium which cements them to the shell appears to be gelatinous, for it is loosened and detached by maceration and boiling, operations which have an opposite effect on fibrine.

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* These particulars are from Cuvier's Comp. Anatomy.

Molluscous animals are either erratic or permanently stationary. The former, according to the different modes of their progression, may be distributed into three classes; viz. those which swim, those which creep in an even continuous manner, and those which drag themselves forward at interrupted intervals.

The *Cephalopodous* Mollúsca, or cuttle-fish, belong to the first class. These singular animals swim at freedom in the bosom of the sea, moving by sudden and irregular jerks, the body being nearly in a perpendicular position, and the head directed downwards and backwards. Some species have a fleshy muscular fin on each side, by the aid of which they accomplish these apparently inconvenient motions; but at least an equal number of them are finless, and yet can swim with perhaps little less agility. Lamarck, indeed, denies this, and says that these can only trail themselves along the bottom by means of the suckers, which are so beautifully arranged along the internal edge of their tentacular arms.* This is probably their usual mode of proceeding; that it is not their only one, we have the positive affirmation of other observers. Thus Cuvier tells us that the Octòpi are excellent swimmers, and move in the water with rapidity†; and Dr. Grant, when describing an individual of the same genus which he had preserved in sea-water, says, "The animal swam several times hurriedly across the basin, always with its posterior extremity forward, by repeatedly striking forward the whole of its webbed arms at the same instant."[*] Mr. Cranch likewise informs us, that the parasitical and finless Ocýthoë swim freely when out of their shell, having, as he adds, all the actions of the common Octòpus of our seas. These quotations, we presume, will be deemed conclusive; and, from the first, we learn by what organs they swim. It is by means of the tentacula just mentioned; long tapered organs, which encircle the head as with a crown, are capable of being inflected in every direction, and, in this tribe, are edged with a web-like membrane, serving to unite them all together towards their origins. Desmarest has observed the Octopòdiæ to have another mode of progression, and one very unusual amongst animals; viz. by rolling over upon themselves with great velocity, and without fixing themselves by their tentacula.[†]

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* Hist. Nat. des An. sans Vert., vii. 583. and 656.

† Cuvier's Mémoires, i. p. 3.

Some[‡] of this tribe, as I formerly hinted, take possession of the shell of the paper nautilus (Argonaúta A′rgo), and make it their boat; a purpose for which it is admirably fitted by its lightness and navicular form. It is said that the *Sèpia* lays over each side of the shell three of its tentacula, which it uses for oars, and raises up other two dilated at their ends by a thin oval membrane, which fancy may compare to a sail, and which serve the purpose of one. Having, by a process yet unexplained, risen to the surface, this pirate sailor thus plies his vessel with oar and sail; but ever timorous as a guilty thing, he shrinks within on the least alarm, and sinks again into his port, the deep. (*fig.* 129.)

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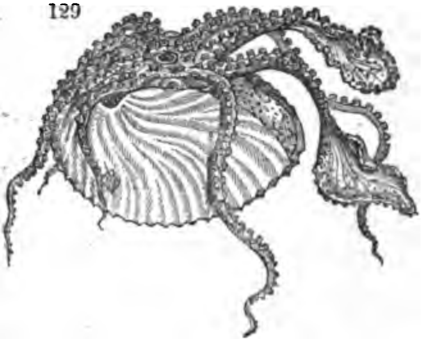

"Light as a flake of foam upon the wind,
Keel upward from the deep emerged a shell,
Shaped like the moon ere half her horn is fill'd;
Fraught with young life, it righted as it rose,
And moved at will along the yielding water.
The native pilot of this little bark
Put out a tier of oars on either side,
Spread to the wafting breeze a twofold sail,

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[*] Edin. Phil. Journ., xvi. 313.

[†] Blainville, Man. de Malacologie, p. 149.

[‡] Bosc says that more than one species occupy the shell of the Argonaúta A′rgo. *Hist. Nat. des Vers.*, i. p. 50.

And wander in the luxury of light." *

Such is the uniform account handed down to us by naturalists and poets from a very early period; nor need you scruple to adopt the wonderful tale. It is true that "there are not wanting plain matter-of-fact naturalists who deny that the animal *sails* at all †;" but this unbelief savours of over-scepticism, or has perhaps no better foundation than a verbal quibble. The story is told by several, who appear to have been eye-witnesses of the fact ‡, and it is, in every particular, conformable to the structure of the creature. It has six tentacula tapered to a point, and it has two with a dilated membrane at their tips; and does it seem improbable, as authors tell us, that these are held in different attitudes, and are fitted for different purposes, while the cuttle pursues its vagrant course? Literally, though the contrary has not been proved, the breeze may not fill the sails and become the moving power; yet to say that the parasite of the Argonaúta sails is scarcely speaking in a metaphor.

The *Heteropode* and *Pteropode* Mollúsca are likewise all denizens of the ocean, in whose wide waters they move by swimming, or by calmly floating with the current. They have no foot wherewith to creep, and they have no arms to drag themselves. The former are furnished with fins, variable in number and position according to the species; in the latter they are always two, one being situated on each side of the head. By an undulatory or flapping motion of these organs, they move on at a slow rate, and in a reversed position, some in their progress alternately dipping below, and reascending to the surface. The whole of them, indeed, it is probable, are capable of varying the specific gravity of the body at pleasure, so as to rise or sink in the water as circumstances may require. In calm weather, they will frequently ascend and float on the surface in immense shoals, as is the case with the Clìo boreàlis and Limacìna heliciàlis of the Arctic seas; little snails which I should have introduced to your notice earlier, as furnishing the whale a great part of its sustenance. In swimming, according to the intelligent navigator Scoresby, the Clìo

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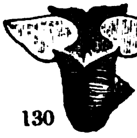
* Montgomery's Pelican Island, canto i.

† Zool. Journal, iv. 58.

‡ In his *Account of an Expedition to Surinam* (vol. i. p. 11.), Stedman has given a description of the Argonaúta, concerning the accuracy of which I would wish to warn the reader. He seems to have observed the *H*olothùria Phýsalis (which is not a molluscous animal), and mixed up the description of it with what he had read or heard of the Argonaúta.



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"brings the tips of its fins almost into contact, first on one side and then on the other." * (*fig.* 130.)

Of the *Gasteropodous* Mollúsca, which embrace all the slug-like species, and nearly all those covered with a univalve shell, a very few only can be said properly to swim. One of them, the Glaúcus Fórsteri, swims on the surface with a rapidity unexampled in the class; and the curious Tèthys can swim very well by means of the large semicircular expansion of its cloak, which rises like a tippet above the neck. But these are exceptions, for almost all are doomed to crawl upon the belly, at a pace proverbially slow. The inferior surface of the body is formed into an oval or oblong disk, of a firm texture, composed of muscular fibres, which run, some in a transverse, and some in a longitudinal direction, but so closely interwoven, as not to be separable into distinct layers. This foot, as it is called, is susceptible of being lengthened and shortened; and by undulatory motions propagated along its surface, resembling, to use the apt comparison of Swammerdam, "the waves and billows of the sea," the Gasteropode moves forward in a continuous manner, marking its track, in the land species, with a silver line of concrete slime exuded to smooth the asperities of the road.† You cannot fail to have noticed the snail in its pilgrimage; and the aquatic tribes progress in precisely the same way, whether they slowly traverse the floor of ocean, or climb the rugged steeps of the rock, or stray amongst their groves of sea-weed and coral. To their progress the shell, one would imagine, must prove a serious obstacle, both by its occasional size and weight. A fine specimen of the Cássis tuberòsa, in my cabinet, measures fully 10 in. in length, and upwards of 8 in. in breadth; another of Stròmbus gìgas is nearly 1 ft. in length. The weight of the former is 4 lbs. 2 oz., that of the latter 4 lbs.

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* Account of the Arctic Regions, vol. i. p. 544.

† This is the usual account, but, according to Mr. Main, it is erroneous; the muscular motions, instead of being from head to tail, being propagated in the contrary direction; so that the animal's motion cannot be caused by impulses in the direction of its progress. He gives two conjectures as to the cause of the animal's motion; namely, 1st, that the body is moved forward by the retromissive discharge of slime, which, being emitted simultaneously from every part of the under surface, he conceives, may exercise a force adequate to the propelling of the animal; or, 2dly, from its power of forming its lower surface into segments of circles along the whole of its length; and thus, by assuming a vertical vermicular action on the plane of the sustaining surface, impelling the body forward by alternate contraction and expansion. As dry air deprives the animal of motion, Mr. Main is inclined to consider the first surmise the more probable. See *Zool. Journ.*, iii. 599.

9 oz.; yet the snail creeps under this load at apparent ease. Those which, like the Hélices and *Tr*òchi, have conical shells flattened at the base carry them upright; but when the shell is fusiform, or turreted, it is trailed in nearly a horizontal position, with the point always directed backwards. The Cypr*æ`æ*, when they walk, cover their shell with the lateral lobes of their cloak, which are very often beautifully and vividly marked with various colours; and many other Mollúsca cover their shells more or less completely with similar expansions. But the Pleurótoma is the most singular of all in this respect. According to Argenville, when this Mollúsca creeps, it elevates and sustains its shell and cloak upon a rather long peduncle or stalk, which rises vertically from the back. In consequence of this remarkable position of the shell, the animal tumbles over at every impediment; but it heeds not, quietly resumes its proper attitude, and pursues the road.*

All Gasteropodes are not confined, however, to crawl on the solid bottom: many of them can ascend to the surface, and make the waters a liquid pavement, along which they creep, in the same manner as they do on land, with the difference only of having their body and shell in a reversed position. I have observed the once terrible Aphýsia depilans crossing pools on our shore in this way; and there is some reason to believe that all the marine naked Mollùsca possess this faculty. When I have confined a number of the minute Túrbines, so common on our coasts, in a glass of sea water, some have very soon suspended themselves from the surface; but it is the freshwater snails (Mollúsca pulmonífera) which exhibit this not unremarkable mode of progression in the most perfect manner. On a summer's day any one may see the Lymnæ`æ (*fig.* 131.) and Planórbes thus traversing the surface of ponds and ditches in an easy undulating line †, or suspended there in luxurious repose, perhaps —

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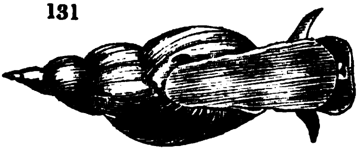

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* Lamarck, Anim. sans Vert., vii. 90. If a molluscous animal be touched during progression, it immediately, as it is well known, shrinks and stops for a time: but a terrestrial species (Helicolìmax Lamárckii) affords an exception; for, "if disturbed or irritated, it only crawls the faster; and, if at rest and contracted, it directly puts itself in motion on being touched or disturbed." — *Lowe* in *Zool. Journal*, iv. 342.

† Muller says that in this position no motion of the foot is perceptible. "In fluviatilibus nulla quidem undulatio percipitur; ope tamen occultæ rotationis vel ignoto mechanismo nec lentius, quam terrestres, progrediuntur." (*Hist. Verm.* ii. pref. xx.) "In freshwater snails there is no percep-

That light is pleasant, and the sunbeam warm."

When thus suspended they will sometimes relax their hold and drop at once to the bottom, from which, in general, they emerge by crawling up some solid body: but occasionally I have seen them rise up direct through the water; a fact I can explain only by supposing that they have the power of compressing, in the first instance, the air in their pulmonary cavity, and of again allowing it to expand and dilate so as to render the body lighter than the medium in which they live.

One pretty lacustrine species, the Phýsa fontinàlis, can let itself down gradually by means of a thread affixed to the surface of the water *; a manner of proceeding which finds an analogy only in some land slugs, which have been observed to spin a line of the glutinous secretion from their skin, and thus let themselves down from trees and over precipices.

I have said that many freshwater Mollúsca occasionally float at ease, but there is a marine genus to which this is habitual, nor does it seem certain that it can change its place in any other way. This genus is the Ianthìna, which, by the aid of a spongy organ, attached to the posterior part of the foot, and composed of little vesicles, apparently filled with air †, floats without any exertion, and probably directs its course by means of a small membrane, which runs along each side of the foot, a little above its edge. The common species is an inhabitant of the seas of the West Indies, and it has sometimes been driven on the shores of Scotland and of Wales, no willing visitant, you may believe, of these northern climes, yet treated by British naturalists as a native of them. As the animal is really one of much interest, I will transcribe for you what Brown says of it in his *Account of Jamaica*: — "The creature probably passes the greatest part of life at the bottom of the sea, but rises sometimes to the surface, and to do so, it is obliged, *piscium more* [after the manner of fishes], to distend an air-bladder; which, however, is formed only for the present occasion, and made of tough viscid slime, swelled

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tible undulation; but their progression, by means of some concealed rotation or unknown mechanism, is not more slow than that of land snails."

[*] Montagu, Test. Brit. p. 227.

[†] Cuvier thinks that this organ bears some analogy to the opercula of other univalves, and that it may be a vestige of an operculum which has undergone such modifications in its form and structure as we frequently observe in the productions of nature. (*Sowerby's Genera*, No. v.) I consider this as an example of those false analogies or affinities which so much abound in modern works on natural history, and which seem got up for no other purpose than to prop a favourite theory.

into a vesicular transparent mass, that sticks to the head of the animal, at the opening of the shell. This raises and sustains it while it pleases to continue on the surface; but when it wants to return, it throws off its bladder, and sinks. I have taken up many of these insects alive, with the bladder yet affixed to the aperture of the shell, and still preserve some with it on in spirits. I have also observed many of the vesicula themselves swimming upon the surface of the water about that place, which induced me to think they were thrown off as the creature retired."

The Mollúsca with bivalve shells can none of them, according to Dr. Fleming, float on the water, neither can any of them swim; but many have the power of moving from one place to another by means of a muscular foot, which they protrude and retract at will. This organ varies in form in the different genera; but in the locomotive tribes it is in general of an oblong shape, often with a bend in the middle, and more or less compressed. It is of a firm semi-cartilaginous texture, composed of interlaced fibres, and drawn inwards, or exserted by other muscles, which run towards different points of the shell where they are inserted. Its length is often surprising. I have seen a small individual of the Modìola díscrepans put forth a foot at least six times longer than the shell, which, nevertheless, when not in action, was so neatly folded up and contracted within it that no part was visible.

Bivalve Mollúsca proceed at a rate even slower than that of any snail, and, perhaps, seldom attempt the exercise, unless driven by some urgent want. One species only (Psammòbia aurántia *Lamar.*) is certainly known to creep like the Gasteropodes, although, from the structure of the foot, it has been conjectured that some A'rcæ likewise do so.* The rest, when bent on change, leisurely protrude the motive organ, extend it to the utmost, apply it with hesitation and care to a solid surface, and then, by contracting it, as with a painful effort, they drag on the body and its testaceous envelope. Now the foot is again extended in the same cautious manner, and the shell again dragged forward to the point of fixture. Such is the manner in which I have seen the Cyclas, an inhabitant of our ponds, and some of the lesser bivalves which inhabit our shores, move along; and, I presume, it is in a similar manner that the other and larger species proceed; though I am aware that a somewhat different and complicated mode of progression has been attributed to the fresh-no means satisfied.* The scallops (*Pecten*), it has been asserted, can even leap by first opening their valves to the utmost, and then closing them by a strong and sudden effort. When deserted by the tide on any occasion, they will tumble forward in this way until they have regained the water. Nay, some popular writers repeat a story from the ancients that these scallops can rise up from their beds in the deep, and navigate the surface, having one valve raised and exposed with its concavity to the breeze, while the other remains under the water, and answers the purpose of an anchor, by steadying the animal, and preventing its being overset; but this part of their history you may safely reject.

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* Blainville, ut sup. cit. p. 151.

There is lastly an order of rather doubtful Mollúsca which have no shell, but merely a coriaceous membrane for their envelope, and which, in consequence, have been named Mollúsca tunicàta by modern naturalists. By far the greater proportion of these are fixed animals, but some of them swim in and on the ocean; not, however, by the aid of any particular organ, but by partial contractions of their cloak. The *Sálpæ* are examples of this tribe, of which a number of individuals belonging to the same species will cohere together by minute suckers which garnish their sides, and form floating chains, more obvious, it may be, in the night season than during the day, from the phosphorescent light they diffuse. The Pyrosòmæ (*fig.* 132.) are a still more singular family of the same order. Each seeming individual of this genus is, in fact, a numerous colony of little Mollúsca, each in its own cell, distinct, yet inseparably connected with its fellows. Collected into the figure of a gelatinous cylinder, open at one extremity and closed at the other, and roughened externally by a multitude of tubercles disposed sometimes in rings and sometimes irregularly, they float in the Australian seas like stars of this lower world, shedding around them a halo of light, brilliant indeed, but surpassed in beauty by those other colours of the

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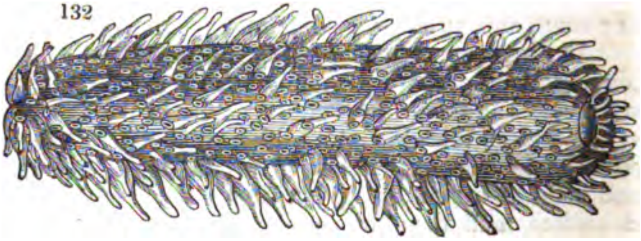

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* Smellie's Phil. of Nat. History, i. 137.

creatures which it serves to disclose; colours which come and go at pleasure, glorying, as it were, in their subtle changes, passing rapidly from a lively red to aurora, to orange, to green, and to azure blue; a magic scene, compelling more than the admiration of every beholder. "O Lord! how manifold are thy works! in wisdom hast thou made them all."

Note. — In this, and in a preceding letter, I have characterised the *Sèpia*, usually found in the shell of the Argonaúta A'rgo, as a parasite; but in a late number of the *Edinburgh New Philosophical Journal* I find it stated that the opposite opinion has been satisfactorily proved by Professor Stefano delle Chiage of Naples, who has an engraving which exhibits "in embryo, within the ovum, the rudiments of the shell in which the animal lives." I must, however, acknowledge that I am still sceptical on this point; but I will here state, in the shortest manner, the arguments for both opinions.

PARASITICAL.	NON-PARASITICAL.
1. The *Sèpia* has no organic or muscular connection with the shell. *Aristotle, Cranch, Poli.*	1. The *Sèpia* is connected to the shell by a ligament. *Blanchard.*
2. More than one species of *Sèpia* inhabit the same species of shell. *Bosc.*	2. No animal but the *Sèpia* has ever been found in the shell which is common.
3. The outward markings of the animal do not correspond with the sculpture of the shell. *Blainville.*	3. The animal, when fresh, presents upon its cloak the exact form of the shell, and the impressions of the grooves and tubercles with which it is ornamented. *Ferussac.*
4. The ovum contains no trace of a shell (*Bauer, Roget*); nor is it contained in a chambered nidus. *Home.*	4. The construction of the shell is entirely conformable to the organisation of its inhabitant. *Ferussac, Blanchard, Cuvier.*
	The ovum contains the shell in embryo. *Duverney, Poli, Blanchard.*

The evidence is so contradictory that there seems no alternative but to conclude that the shell has been formed by one Cephalopode, its proper inhabitant; and is occasionally occupied by another Cephalopode, its parasitical tenant.

I am, Sir, yours, &c.

G. J.

ART. X. *Farther Illustration of Observations on Vessels made of the Papyrus.* By JOHN HOGG, Esq. A.M. F.L.S. &c.

Sir,

ON perusing Captain Robert Mignan's *Travels in Chaldæa* I was struck with his descriptions of several kinds of vessels, made of the *P*apy̆rus (Vol. II. p. 324—332.), I beg to submit the following passages to the notice of the readers of your Magazine: — Captain Mignan relates (p. 23.), that, in passing through an Arab encampment, "parties of both sexes were crossing the stream (Tigris) in a state of nudity, upon a stratum of rush, which is evidently of the same kind as the 'vessels of bulrushes upon the waters' alluded to by Isaiah in chap. xviii. v. 2."

Now this stratum of rush is identical with the sort of bundle of reeds, or *faisceau de paille*, described by Denon, and figured (Vol. II. p. 328. fig. 89.), and is most probably formed of the same species of plant, the paper reed or rush (*C*ypèrus *P*apy̆rus *Lin.*). It is used by the Arab in Chaldæa after the same manner as by the inhabitant of Upper Egypt.

We may refer to E. (p. 242.) for a copious and interesting note on the kelek, or leather raft, of Assyria, where are described three other kinds of barks, differently constructed, and covered with bitumen, and which are constantly in use on the Tigris and Euphrates.

The same author notices (p. 55.) the round wicker-baskets, called in Arabic *kooffah*, and represented in a diagram (p. 56.). They are daubed over with naphtha, and are common on the Euphrates. Herodotus has mentioned them in his account of Babylon (Clio, c. 194.); and they have undergone little or no change since he visited that country. On the Tigris, near Bagdad, he further remarks (p. 54.): "We passed a fleet of boats laden with wood. These vessels are of a most singular construction, being put together with reeds and willow, thickly coated with bitumen: the prow is the broadest part of the boat, being extremely bluff, and the whole as clumsy and unwieldy as possible." A neatly executed wood-cut (p. 55.) gives a view of two of these Bagdad wood-boats, which are two-prowed and crescent-shaped, and most remarkably resemble in their form the ancient canoe figured Vol. II. p. 329. fig. 92.

I will now only remark, since these vessels are common at the present day, as well on the lakes and rivers of Egypt and Abyssinia, and the Red Sea, as on the Tigris and Euphrates, and are of the like shape, and built with the same materials as in the days of the sacred and heathen writers, that the same sorts of boats and rafts or floats are commonly used on all the rivers, lakes, and streams of Northern Africa, Arabia, Judæa, Syria, Armenia, Mesopotamia, Chaldæa, Babylonia, and even of a great portion of the East. And, moreover, have remained unaltered since the times of the earliest historians.

Yours, &c.

July 31. 1830. JOHN HOGG.

ART. XI. *On the Specific Identity of* Anagállis *arvénsis and cærùlea.* By the Rev. J. S. HENSLOW, Professor of Botany in the University of Cambridge.

Sir,

DR. HOOKER, in his most excellent *British Flora*, still keeps the *A*nagállis cærùlea distinct from the *A.* arvénsis; and perhaps the difference pointed out by him in the shape of the petals fully justifies him for so doing in the present uncertain state of our knowledge of the laws which regulate the limitation of species. I received last year, from the Reverend E. Wilson, some specimens and seeds of *A*nagállis cærùlea gathered in Yorkshire. From these seeds I have raised a dozen plants, nine of which have blue flowers, and three have red. Hence it should seem that in future *A*nagállis cærùlea must be considered as a variety of *A.* arvénsis. I conclude, from the above fact, that whatever may be the cause which disposes the petals of this species to assume a blue colour, this likewise disposes them to become notched or toothed at the margin, as Dr. Hooker has universally observed them to be. Though we cannot say the following law is certain in botany, yet it seems to me very likely to be true, viz. "That if a change takes place in one of the organs of a plant, a simultaneous change may be expected in some or all of the other organs considered to be modifications of the same organs." For instance, considering the calyx and corolla to be modifications of the leaf, when we see the leaf of the cowslip differing from that of the primrose, we need not be surprised to find that the calyx and corolla should differ also, though these plants be not distinct species, as I showed in my communication to the last Number of your Magazine.

I have met with the light pink variety of *A.* arvénsis at Higham, Kent; and the gentleman from whom I received the seeds of the blue variety mentioned in this communication, sent at the same time, and from the same place, some seeds of a white variety, similar to that received by Dr. Hooker from South Wales. From these seeds I have raised seven plants, one of which flowered red, and the other six white, tinged more or less with light pink, and having a bright pink eye. I wish I could persuade some of your correspondents to try similar experiments, in different parts of the kingdom, upon any of the various plants which approach each other so nearly as to leave it still a matter of doubt whether they ought to be considered distinct species or mere varieties of the same. I have some of them under trial, and propose sending you the results from time to time; but, as accidents are unavoidable, it would be more satisfactory to see them confirmed from different quarters.

I remain, Sir, &c.

Cambridge, September 17. 1830. J. S. Henslow.

Art. XII. *Some Remarks upon the late Winter of* 1829–30, *and upon the general Character of the Weather which preceded and followed it.* By the Rev. Leonard Jenyns, M.A. F.L.S.

The late winter having been more severe than what is usually experienced in this climate, it may not be without interest, or without some benefit to the science of meteorology, to record a few particulars connected with its commencement and duration.

In the first place, it is worthy of observation that it was preceded by a remarkably wet and cold summer.* What the exact quantity of rain was which fell in the course of that season, I am not prepared to say, not having made any regular measurement of it; but, from other memoranda which I preserved, it appears that at Swaffham Bulbeck, in Cambridgeshire, the number of wet days which occurred in the months of June, July, August, and September, 1829, was 14, 20, 19, and 14 respectively. The mean temperature, calculated from the observations made, in most instances daily, at the hours of 9 a. m. and 8½ p.m., was, for June 60·4°, for July 60·7°, for August 58·2°, and for September 53·4°.

It will be remembered that the summer of 1828 was likewise characterised by the great quantity of rain which fell at intervals more or less throughout the season; but in that instance the bad weather was observed to clear off in a great measure towards the middle of September, and was followed by an unprecedentedly fine and mild autumn, which continued, with scarcely any interruption by frost, quite to the close of the year.* It was far otherwise in the year 1829; for though, as before, the fall of rain somewhat abated in the months of September and October, yet the weather, considered generally during those months, was dull and cheerless, and the mean temperature lower than had been experienced for several preceding years. Perhaps it is worth mentioning that, on the 7th of October, large flocks of wild geese were seen flying in a south-westerly direction, it being earlier than I ever remember to have noticed these birds before; and it was on the following night that the first frost occurred.

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* This fact is very much in accordance with some observations by Mr. White, who, in his *History of Selborne*, mentions two or three instances of long and severe frosts which set in after very rainy seasons. (See his 62d Letter to the Hon. Daines Barrington.)

Neither did the weather receive any sensible improvement as the year declined: on the contrary, the temperature in November became still further reduced, and winter seemed approaching by unusually rapid strides. Now and then a mild day was experienced; but at intervals, especially towards the middle of the month, there was an occurrence of sharp frost; and on the 25th this was accompanied by snow, which came on in the night previous, and fell throughout the day; a brisk wind springing up at the same time from the north-east, the snow was considerably drifted, insomuch that, in some places, the roads were for a short time obstructed.

The beginning of December was somewhat warmer than the preceding month, and on the 4th a good deal of rain ensued; but on the 6th the weather relapsed very much into its former state, with mostly frost at night, little or no sun during the day, and the wind fixed in the east. On the 11th the wind changed, passing from the east to the south-east, and thence, through the south, to the south-west. This was followed by four or five days of dense fog, which came on soon afterwards, and hung in the atmosphere night and day together with scarcely any intermission; and it is worthy of especial notice, that it was during the prevalence of this fog, after a second shift of the wind back to the north-east, that the weather first assumed that more determined appearance by which it was afterwards characterised.† Indeed, from the night of the 15th we may date the commencement of a frost which continued during the remainder of that month, the greater part of January in the following year, and on to the end of the first week in February, a period, on the whole, of nearly two months.

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* Throughout the month of December, 1828, the thermometer at Bottisham (distant half a mile from Swaffham Bulbeck) was in no one instance during the day (that is to say, between sunrise and sunset) below the freezing point, and, till the 26th, was not below 40° within the same period.

† I find, by referring to Howard's *Climate of London* (tab. 89.), that the severe winter of 1813–14 had its commencement, as in the present instance, during a *succession of thick fogs;* and in another part of that essay (tab. 115.),

The weather, however, during all this time, was far from being equally severe. As the frost itself came on very gradually, so after its commencement the degree of cold was very gradually increased; and, for a few days, the range of the thermometer was inconsiderable, the mercury seldom rising above, nor yet falling many degrees below, the freezing point. But after the 21st the cold became greater; and from the 23d to the end of the month, during which interval the thermometer on one occasion descended to 15°, the mean temperature was only 26·2°. Throughout the last fortnight of the year, snow fell more or less nearly every day, notwithstanding a high and rising barometer. This appeared, for the most part, in the character of flying storms from the north-east.

It is remarkable that the commencement of the new year was characterised by more snow, which continued falling at intervals throughout the 1st of January, although the barometer, at 9 A.M. on that day, had reached the unusual elevation of 30·61. The temperature, however, at this time rose; and from the 3d to the 8th, with the exception of one night, there was a slight interruption of the frost, attended at intervals by much fog and mizzling rain: still the thermometer, during that period, was seldom many degrees above the freezing point, and in only two instances as high as 40°. These occurred on the 5th and 7th of January, both of which were extremely fine days, and the only ones at all pleasurable to the feelings which had been experienced for upwards of three weeks. Indeed, on the second of these occasions, we were almost induced, from the promising appearance of the sky, to anticipate some decided change of weather; but our hopes were soon at an end. The very next night after the 7th, the thermometer fell again several degrees below the freezing point, attended by more snow; and from that time to the 7th of February there was scarcely any further variation in the weather at all, it being marked by one continued succession of frost and snow, with keen winds, principally from the east and north-east; or when no snow, by alternations of mist and sunshine. But though, in general respects, the weather presented a very uniform character during this period,

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the author speaks of *copious mists* as generally accompanying the setting in of long frosts.

yet, as in the former instance, the cold was not equally severe the whole time. For the first nine days, that is to say, from the 8th to the 16th of January (both days inclusive), the mean temperature of the 24 hours ranged from 28° to 33·5°; but on the 17th it descended to 25°, and on the 18th to 16°.* On the 19th it was likewise as low as 20·5°, but on the 20th it rose again to 32°; and thence to the 30th the cold somewhat abated, the mean temperature seldom descending much below the freezing point, and occasionally rising as high as 34° and 35°. However, on the 31st, the frost again set in with increased severity; and the mean temperature of the six first days in February was only 20·6°.

I have endeavoured above to trace the principal fluctuations of the mean daily temperature during the continuance of this long frost. The first break to the severe weather occurred on the 7th of February, when a decided thaw took place, attended by much wind and driving rain from the south; yet, after two or three days, the weather showed a strong disposition to relapse into its former state, and a full fortnight expired before there was any considerable rise of the thermometer; which instrument, during this period, was seldom higher than 40°, often not so high, and frequently descended in the night to 28° and 25°. It was not till the 24th of February that any thing like an approach to spring weather was experienced. On that day, however, without any apparent cause, the wind remaining in the same quarter in which it had been for the four previous days, the thermometer rose to 55·5° in the shade, being more than 10° higher than it had stood at any time before since the commencement of the new year. This sudden increase of temperature seemed to exert considerable influence over both the animal and vegetable world: a few plants were observed in flower; many insects came on wing; the birds resumed their song; and, more especially, large flocks of wild geese, none of which had been noticed since October, 1829, were seen shifting their quarters principally in the direction of north and north-west. Neither was this a mere temporary change: from that time the weather became more seasonable, and, especially from the little rain thoroughly drying the country of its superabundant moisture, and thereby adapting the soil for the important purpose of sowing.

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* It is a curious fact, that during this severe weather a brood of tipulideous insects (Trichócera hiemàlis *Meig.*) suddenly made their appearance and were noticed abroad in considerable numbers, settling upon the walls of different outbuildings, as if they had just emerged from the pupa state; and though they did not offer to take wing for several weeks, yet they readily moved their quarters when disturbed; a proof that, notwithstanding the continued frost, they had the power of resisting torpidity, and to a degree far exceeding any other insects.

From the circumstance of the ground being more or less covered with snow throughout the whole period (though, except where drifted, it was never more than a few inches in depth), the long and severe frost did not appear to have caused any essential injury to vegetation. The evergreens, however, in some situations, were an exception, and more especially the bays, laurustines, and laurels, many young plants of which were at once killed to the ground, whilst others were so injured as to give little hope of their final recovery. It is worth noticing, with respect to the laurels in particular, since it confirms an observation by Mr. White, in his *Natural History of Selborne* *, that those only suffered to any extent which had been planted in *southern aspects;* and this was so remarkably the case, that, in one or two instances in which they grew on the north side of the border, but had overtopped the other shrubs, the uppermost branches, which from this circumstance were occasionally exposed to the full action of the sun, turned of a dead yellow, whilst the rest of the plant remained green. Doubtless, as Mr. White observes, this is owing to the repeated melting and freezing of the snow upon the surface of their leaves, to which the plants are, under such circumstances more than any other, necessarily subjected.

It is also remarkable that the hard winter had not the effect of even retarding vegetation to any thing like the extent which might have been looked for. Of course, all those plants which, in ordinary seasons, put forth their flowers during the months of December and January, or in the early part of February, such as the winter aconite (Eránthis hiemàlis), snowdrop (Galánthus nivàlis), hepatica (*H*epática tríloba), furze (*U*lex europæ̀a), hazel (Córylus *A*vellàna), stinking hellebore (*H*elléborus fœtidus), spurge hazel (*D*áphne Laurèola), and many others, will, in such a season as that we have lately experienced, remain in a nearly torpid state so long as the frost and snow continue. But it was curious to observe how soon these plants were in flower immediately after the first breaking up of the hard weather; whilst in the case of other species, which naturally do not blow till March or towards the end of February, scarcely any difference in the time of flowering was remarked. The same may also be said with horsechestnut by the 23d; it being, in each case, only five days later than in the season following the unparalleled mild winter of 1821–22: whilst a large number of other trees began to exhibit their foliage towards the end of that month and the beginning of the next; many of which, as the lime, elm, birch, beech, and hornbeam, were even several days earlier in that respect than the same trees in the year above-mentioned.

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* See his 61st and 62d Letters to the Hon. Daines Barrington.

There can be little doubt that this forward state of vegetation was, latterly, in a great measure owing to the unusually hot weather which prevailed during the last week in March. The former part of that month, indeed, may, with the exception of a very few days, be said to have been mild; but upon the 25th the thermometer rose to 60°, and from that time to the 30th the temperature was, perhaps, higher than on any six consecutive days before remembered at so early a period of the year. I regret that absence from home prevented me from noticing the exact maximum degree of heat on the 26th and 27th; but so late in the day as 5 P.M. I found the thermometer, on each occasion, standing in the shade as high as 67°; and on the two following days the same instrument, in a situation where it was wholly out of the reach of radiation, rose to 66° and 69° respectively. On the 30th it fell again to 60°. The weather during these six days was extremely fine, and uniformly followed after sunset by calm bright evenings, which caused at night, as is usual under such circumstances, a considerable radiation of heat from the surface of the earth. To try the extent of this, as well as the force of solar radiation during the day, on the evening of the 27th I placed a small thermometer, having a naked bulb, upon short grass, in a situation where it was fully exposed to the open sky. By 7 o'clock this thermometer had fallen to 40°, and by 9 o'clock to 38°, having the bulb and stem of the instrument covered with dew. At the time of this last observation the temperature of the air was 49·5°, indicating a difference of 11·5°.* I again examined this thermometer at 6 o'clock on the following morning, when I found it standing at 30°, and firmly held to the grass by hoar frost; but the temperature of the air had likewise fallen as low as 37°; so that the difference between them, or the amount of terrestrial radiation, was at this time

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* Daniel states the maximum force of terrestrial radiation ever observed by him in this month to be 10 degrees. (*Meteorological Essays*, p. 230.)

presents a secondary bow, having its colours of course in an inverse order to those of the primary. But from E, in the direction E F, came the segment of a third bow, commencing, as nearly as could be guessed, between 15° and 20° from the vertex of the secondary, and descending in the direction shown in the figure. This segment was equally vivid with the secondary, but had its colours in the order of the primary. No continuation of it could be discerned above or on the left of the secondary, and its centre evidently lay considerably to the left of that of the other bows. The termination at the lower extremity (F) was abrupt and well defined. It remained visible for more than ten minutes; the extremity (F) appearing latterly to have moved somewhat nearer to the primary bow, from which, however, it was never less than a bow's breadth distant. The side c of the upper bow first became invisible, but so long as the other side could be seen the segment could also.

A somewhat similar phenomenon is recorded in the *Phil. Trans.* p. 1793., as having been seen on the coast of Hampshire; and the explanation there offered is, that the additional bow was caused by the reflection of the sun from the sea when perfectly still. But, if this were the cause, would not such appearances be more usual? Besides, if a ray of light proceeding from the earth falls on the lower side of a drop, must it not be refracted into the air (as in *fig.* 314.), and not towards the earth, S being considered the reflection of the sun? And what again becomes of the received opinion, that the eye of the observer must be in the apex of the cone, of which the bow forms the base?

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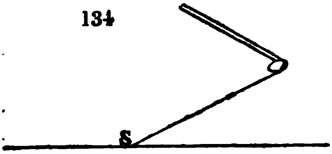

I am, Sir, &c.

Coventry, Oct. 12. 1829. E. G.

PART II.

REVIEWS.

Art. I. *Sýlva Británnica; or Portraits of Forest Trees distinguished for their Antiquity, Magnitude, or Beauty.* Drawn from Nature by Jacob George Strutt. Imp. 8vo. London, published by the Author, 8. Duke Street, St. James's.

We should be sorry to be accused of puffing, or deemed chargeable with being lavish in bestowing praise, where the same is not justly due. We can, however, without scruple, conscientiously assert that this is, in our judgment, really one of the prettiest and most elegant books we have ever seen. Our opinion of Mr. Strutt, and of his merits as an artist and man of taste, is already known to our readers, from the remarks we made in a former Number, when his *Delíciæ Sylvàrum* passed under our review. We availed ourselves of that opportunity to make incidental mention also of his previous work, the *Sýlva Británnica.* The pen was scarcely laid aside, and the ink was only drying on our paper, when, behold! forth issues from the same source another *Sýlva Británnica,* the larger work having produced a little one. Whether Mr. Strutt has duly consulted his own interest in putting forth this second, and comparatively small, edition (which will be likely, we think, to interfere with, if not entirely to supersede, the sale of the former one), is no business of ours; and we shall not stop to enquire. Should it be thought that the publications in question are in some respects too dissimilar to bear exactly the same name; it may be urged, on the other hand, that they are in essentials far too much alike to justify the imposition of a different one. As some little confusion, however, perhaps disappointment, may occasionally arise between the booksellers and their customers, from the circumstance of the name and title of the parent having descended unimpaired to the offspring, we shall proceed to point out in what respects they agree, and in what they differ.

The work, then, in imperial octavo, whose title stands at the head of the present article, is, in fact, a smaller edition of its folio namesake, with some omissions, however, and some additions; and it bears about the same relation to its predecessor as a watch does to a time-piece: or, to adopt our author's more elegant comparison, it "will afford a gratification similar to that which a lover of art derives from comparing a finished miniature with the same subject in full size." The original folio work, from its size, the labour expended on the plates, and the splendid style in which it was got up, was necessarily a somewhat costly publication, and consequently beyond the pockets of many persons, who yet wanted neither the taste nor inclination to become purchasers. The present work, offered at a far lower price, is within the reach of that more numerous class of readers whose means are moderate, and we trust it will obtain a much wider circulation. An octavo volume, too, has the manifest advantage over a cumbrous folio of being more portable and commodious, and, as such, a far more agreeable book to read. And, if we mistake not, it will, from its very size, possess a charm in the eyes of those who subscribe to the truth of the maxim, "Inest sua gratia parvis." We greatly admire the original or parent work; and, in speaking of the present, so far from seeing any cause to alter our tone, and lay aside the language of panegyric, we feel disposed to adopt the complimentary address of the poet to his mistress, and apostrophise this beautiful volume, in the words of Horace: —

> "O matre pulchrâ filia pulchrior."

The two editions contain exactly the same number of plates, namely, fifty; though, as already hinted, there is some variation in the selection of the subjects. Mr. Strutt has omitted, in the new edition, eight of the more unimportant plates contained in the original, substituting in their room an equal number of subjects possessed of greater interest. Of the plates omitted we seriously regret the absence of only one — the Knole Beech, a magnificent example of the species in its vigour, possessing, with its accompanying background of forest scenery, much picturesque beauty, and altogether well worthy of finding a place in any collection of the kind. For what reason Mr. Strutt should have discarded it on the present occasion, we are utterly at a loss to discover; and the more so, as the plate exhibited a most successful effort of his genius, portraying, as it did, with admirable precision, the genuine character and distinctive features of the beech. The new subjects, those we mean which are not to be found in the first edition, are as follows: viz. the Bull Oak in Wedgenock

Park; the Creeping Oak in Savernake Forest, of which a portrait is given in the *Deliciæ Sylvàrum;* the Gospel Oak near Stoneleigh; the Great Beech in Windsor Forest, and the Burnham Beeches, both also figured in the same work; the Fallen Chestnut at Cobham Park; the Great Cedar at Hammersmith House; and the old Cedars in Chelsea Garden. In the present edition, as the entire work has been brought out at once, and submitted to the public in the form of a complete volume, some alteration has been adopted in the arrangement of the subjects, by placing all the specimens of each species of tree in juxtaposition. This certainly is an improvement; as it throws an air of regularity around the book, and gives it a more methodical and systematic character. It should be mentioned, too, that no inconsiderable additions have been made to the letter-press, or descriptive portions of the work.

Such, then, are among the particulars in which the two editions differ from each other. But, as regards the plates, a more important point of discrepance remains to be noticed: we do not allude to their inferiority in size, to their comparative merits, nor to the circumstance of the prints in the new edition being (unlike those of the former one) in the style of sketches or vignettes, but to the *peculiar kind of engraving* of which they consist. On this subject considerable difference of opinion has been found to exist even among those who are not unskilled in the arts. By most persons, we believe, they are taken for etchings executed on copper or on steel plates; and some few of them at least we have heard pronounced by others to have been cut on wood. The fact is, they have neither been cut on wood, nor etched on copper nor on steel, but—on stone! They are pure lithography, and nothing else! Such of our readers as have inspected the plates in question may, perhaps, be a little startled at this assertion, as we certainly should have been ourselves had we heard it made without knowing, as we do, the fact to be as already stated. We are free to confess, that hitherto we have for the most part entertained rather a mean opinion of lithographic prints, and have been accustomed to refer them to the very fag end of the fine arts. The practitioners in this craft we have been in the habit of hearing sometimes called in contempt by the opprobrious appellation of "stone-masons," and have ourselves been almost ready to join in the general outcry against them. In truth, the superior quickness and facility with which lithographic prints are executed, as compared with those engraved on metal or on wood, and the far more agreeable kind of work which is alone requisite to produce them; — the artist in this case not being obliged, like the calcographer, to pore laboriously over a smoked and murky plate, to the injury of his eyesight; but having, on the contrary, a fair, clean, light-coloured surface on which to trace his subject, and work at his ease; — these circumstances, combined perhaps with the novelty of the method, have induced tyros of all descriptions, who could wield a pencil, as well as artists of no mean pretensions, to essay their hand on stone. And the consequence has been, that the windows of the printshops have teemed again, "usque ad nauseam," with the crudest productions of art, and the very counters within have groaned beneath the heaps of trash that have issued from the lithographic press. There were, of course, exceptions: but nine tenths of the stone engravings with which we have been inundated, it may be safely pronounced, scarcely came up to mediocrity; and were fit only to find a place in the portfolio of a child, or, at most, to adorn, — we might rather say *disfigure*, — that motley and multifarious receptacle for the works of genius, which, in modern days, young ladies term a "scrap-book." We never, indeed, for a moment disputed the ingenuity of the invention, or denied its obvious utility in taking off, with despatch, and at a cheap rate, the more ordinary sort of prints, such as plans and mere explanatory illustrations, and other articles in which no very high degree of exquisite workmanship or pictorial effect was either aimed at or required. And we were always of opinion, too, that stone engraving was admirably calculated for the purpose of executing such outlines of subjects of natural history * as are designed to be afterwards filled up and coloured by hand; the soft chalk-like touch of the worker on stone amalgamating far better with the colouring than the sharper and more determined lines of stroke-engraving can well do. But, viewing it on its own merits as a branch of the fine arts, we repeat, we thought meanly of the invention, and deemed it but a pitiful and sorry substitute for copperplate etching, which thus seemed threatened to be almost driven out of the field by its more modern rival. Such was our opinion of stone-engravings till of late; an opinion which, after inspecting Mr. Strutt's performances, and some few others which we have seen [*], we now feel bound in candour to retract. We really did not believe it to have been within the scope and compass of the lithographic art to have produced such beautiful specimens as those which are now before us. Free from the vapid insipidity, the mealy meagreness, so usual with their kind, they exhibit all the brilliancy of stroke and vigour of effect to be found in pure etchings, for which, as already stated, they are commonly taken, and may bear no mean comparison with the more racy productions of the Dutch and Flemish school. Mr. Strutt's plates are by no means all of equal merit; what artist's, indeed, are so? Nor do they, in every instance, appear to have been taken off with the same degree of care, so as to produce equally bright and strong impressions. [†] But, without hesitation, we call upon our readers to admire along with us, among other portraits in the volume, particularly those of the Bull Oak, the Gospel, Wotton, Cowthorpe, and Shelton Oaks, the Cedar at Hammersmith House, and the Willow at Bury St. Edmunds, with its silvery and delicate foliage so exquisitely delineated. In some instances our artist's plates would have been much improved had they been rather more finished, and a little additional labour been expended on them; for example, the Swilcar Lawn Oak, Gilpin's Maple, and still more some of the Scotch subjects, are too slight and sketchy, and, consequently, strike us as deficient in force and effect. From the same cause, the views of the Scotch Fir at Dunmore, and the Silver Fir at Roseneath, and, we might add, the Larches at Dunkeld, actually remind one of snow scenes; and, as they lie in "the north countrie," perhaps Mr. Strutt intended them as such. The Creeping Oak in Savernake Forest, one of with receiving at the hands of an artist like Mr. Strutt such a plate as that of the King Oak in the same forest. And we notice the above circumstances in the hope that, should the work proceed to another edition, the author will discard these plates, at least the former of the two, and execute them afresh; as we feel confident that he is capable of doing more ample justice to subjects which are so exactly in harmony with his own taste, and therefore so well calculated to call forth and display his peculiar excellence. * In the oaks, too, in Yardley Chase, slightly as they are etched, and destitute of the woodland scenery by which they are in reality surrounded, it was at first not without difficulty that we recognised our old friends and favourites, Gog and Magog. Nevertheless, there is *a something* about this plate, in its present raw unfinished state, which we cannot but admire, and which involuntarily calls to our recollection the masterly etchings of Henry Naiwyncx.

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* The plates in Swainson's *Zoological Illustrations* are, we believe, in most instances lithographic; and in our judgment they are scarcely to be equalled, certainly not excelled, by those of any other publication. Some of the shells more especially we think the most beautiful things of the kind we have ever seen. We could wish, however, for his own sake, that Mr. Swainson would not levy so exorbitant a tax on his subscribers, as to charge them half a crown for about eight pages of titlepage, preface, indices, &c.

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[*] We allude more particularly to a large and interesting plate which we have seen at the office of Mr. Netherclift (No. 8. Newman Street, Oxford Street), representing the Martyrdom of Charles the First, together with portraits of Bradshaw, Cromwell, Ireton, and Fairfax (all copied from old prints), fac-similes of the death warrant and of the autographs of the regicides. We believe the plate was executed by Mr. Netherclift, or by some one employed in his establishment; and for clearness and brilliancy of stroke it is not to be exceeded by engraving on copper.

[†] All the copies of the work which we have inspected, amounting to the number of about eight or ten, contain one or more weak impressions, which ought to have been thrown aside, and not suffered to be bound up in the volumes offered for sale. As these failures do not always occur in one and the same plate, but in various ones, they must be attributed, not to the incapability of the plates themselves to produce good impressions, but to the manner in which they have been worked off. We have particularly observed that many of the copies of the Wallace Oak are weak and poor. The greatest care ought to have been taken in the press-work, and every copy bordering on a bad impression discarded.

We have now done with finding fault, and shall proceed to give some account, chiefly extracted from our author's pages, of the two trees, the figures of which are here presented to our readers, executed, like similar ones heretofore, by the hand of that incomparable artist Mr. Williams. The Bull Oak (*fig.* 135.), the property of the Earl of Warwick, stands in a meadow within the boundary of what was formerly Wedgenock Park, one of the most ancient parks in England, according to Dugdale, who informs us that "Henry de Newburgh, the first Earl of Warwick after the Conquest, in imitation of King Henry I., who made the park at Woodstock, did impark it." The tree we should conceive to be one of the very oldest specimens of the kind now remaining in the country; and is, we doubt not, at least coeval with the origin of the park in which it stands, and most probably of much higher antiquity. On this time-worn relic our author tells us that Mr. South makes the following observations, in his fourth letter on the growth of oaks, addressed to the Bath Society: — "About twenty years before the time of his writing (1783) he had the curiosity to measure this tree. Its head was as green and vigorous last summer as it was at that time; and though hollow as a tube, it has increased in its measure some inches. Upon the whole, this bears every mark of having been a short-stemmed branchy tree, of the first magnitude, spreading its arms in all directions round it. Its aperture is a small, ill-formed, Gothic arch, hewn out, or enlarged with an axe, and the bark now curls over the wound, a sure sign that it continues growing: and hence it is evident, that the hollow oaks

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* Mr. Strutt has painted both these Savernake Forest scenes on a large scale. We were exceedingly pleased with his picture of the King Oak, which we saw exhibited in Pall Mall some years ago. Whether he has yet disposed of it, we cannot say; but such are its merits, at least in our eyes, that we wonder it did not meet with a ready purchaser on its first appearance at Somerset House. The etching now before us, pretty as it is in itself, is yet inferior to what we know Mr. Strutt can produce when employed on such a subject; and, in proof of this remark, we need only refer to his plate of this tree in the folio work.

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of enormous size, recorded by antiquaries, did not obtain such bulk whilst sound; for the shell increases when the substance is no more. The blea and the inner bark receive annual tributes of nutritious particles from the sap, in its progress to the leaves; and thence acquire a power of extending the outer bark, and increasing its circumference slowly. Thus a tree, which at 300 years old was sound, and 5 ft. in diameter, like the Langley oak, would, if left to perish gradually, in its thousandth year become a shell of 10 ft. diameter...... Bull oaks," continues Mr. South, "are thus denominated from the no uncommon circumstance of bulls taking shelter within them; which these animals effect, not by going in and turning round, but by retreating backwards into the cavity till the head only projects at the aperture. The one I am about to particularise stands in the middle of a pasture, bears the most venerable marks of antiquity, gives the name compounded of itself and its situation to the farm on which it grows, viz. Oakly Farm, and was the favourite retreat of a bull. Twenty people, old and young, have crowded into it at a time. A calf being shut up there for convenience, its dam, a two-year old heifer, constantly went in to suckle it, and left sufficient room for milking her. It is supposed to be near a thousand years old" [we could readily believe it older]; "the body is nothing but a shell, covered with burly protuberances; the upper part of the shaft is hollow like a chimney; it has been mutilated in all its limbs, but from their stumps arise a number of small branches, forming a burly head, so remarkable for fertility, that in years of plenty, it has produced two sacks of acorns in a season." Thus far Mr. South. "The dimensions," says Mr. Strutt, "of this venerable remnant of antiquity are, at one yard from the ground, 11 yds. 1 ft.; one foot above the ground, 13 yds. 1 ft.; six feet from the ground, 12 yds. 1 ft.; broadest side, 7 yds. 5 in.; close to the ground, 18 yds. 1 ft. 7 in.; height of the trunk, about 4 yds. 1 ft." Having ourselves visited this remarkable tree, and reclined in an idle hour under its shade, we may add that it has long since been carefully fenced round with substantial posts and rails, and has had the two extremities of its projecting limbs supported from beneath by strong pieces of timber. These artificial appendages, creditable as they are to the noble owner, as proofs of his laudable regard for so interesting a piece of sylvan antiquity, have been (*judiciously*, we think) omitted by Mr. Strutt in his drawing; since, however necessary they may be to preserve the tree from external injury, they form no true part of it, and add nothing to its picturesque effect, but, on the contrary, manifestly detract from the beauty of the object.

We pass on to the Gospel Oak (*fig.* 136.), which is a boundary tree, situate at Stoneleigh in Warwickshire, defining the extremity of that parish from the adjoining parish of Baginton.. Many an old oak, as well as other tree, bearing the like title and character, may still be met with throughout the country,

"Religione patrum multos servata per annos."* *Virgil.*

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* "By the religion of our ancestors,
Preserved for ages." *Trapp's Translation.*

We wish we could add, that in modern times such memorials of days gone by always received that respect and fostering care, at the hands of their owners, which their age alone might reasonably demand. The contrary, however, is too often the case. An enclosure of waste lands is on the point of taking place in a certain district, or, perhaps, it is merely

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talked of, and in agitation: previously to the passing of the bill in parliament, and to the partition of the lands among the freeholders, the lord of the manor, sensibly alive to his own interest, and extremely jealous of his rights, or his still more grasping steward, seizes, with the rapacity of a harpy, upon every the minutest item of property to which he can possibly lay claim. Accordingly, each stick of timber, great and small, young and old, thriving and in decay, is cut down from the waste with ruthless and unsparing hand, lest haply, in the general division, it should fall to the allotment of some other proprietor; and thus the boundary-trees, the ancient landmarks of the neighbourhood, the monumental guardians of parochial territory, the very Gospel oaks themselves, whose name alone ought to render them sacred and inviolable, are too often indiscriminately levelled in the general devastation. Several instances of such wanton acts of spoliation have fallen under our own knowledge, and in our immediate vicinity; and we blush for the perpetrators of the deed. The value of these scathed and antiquated trees, as timber, is quite inconsiderable; the bark seldom runs well, and, if it *is* peeled off, consists of so large a portion of *scotch*, as it is called, or dry outside rind, that it is of little worth in the estimation of the tanner. The whole profit, in short, derived from these Goth-like, sacrilegious practices is trifling in amount, and in many cases (we hope it may prove so in all) can scarcely repay the expense of the labour in felling. We could mention an instance, not exactly of a Gospel oak, but an ornamental one, of great size, beauty, and antiquity, cut down by the express order of its owner; the trunk of which was of such large dimensions, that, as it lay along on the ground, two men on horseback, as they sat in their saddles, one on each side the prostrate giant, could not discern the least portion of each other's hats, owing to the large diameter of the intervening but. We visited the tree ourselves, accompanied by a friend, each party on horseback, some years after it had been felled, and therefore can vouch for the accuracy of the statement. For what purpose the tree was felled it would be difficult to conjecture, as the trunk was completely hollow, and must have been known beforehand to be in that condition; and the shell, as might be expected, proved so "unwedgeable and gnarled" as to be utterly unserviceable for the ordinary purposes of timber: accordingly, it lay neglected and unworked up for a number of years; and probably may still remain to this day, to rot at leisure in the spot where it fell.

> "Embowell'd now, and of thy ancient self
> Possessing nought but the scoop'd rind, that seems
> An huge throat, calling to the clouds for drink,
> Which it would give in rivulets to thy root;
> *Thou temptest none, but rather much forbidd'st*
> *The feller's toil, which thou couldst ill requite.*" *Cowper.*

Who can read Gilbert White's graphic account of the vast of the area, — surrounded with stone steps, and seats above them, the delight of old and young, and a place of much resort in summer evenings; where the former sat in grave debate, while the latter frolicked and danced before them:" — who can reflect upon this pleasing picture of rural life without sympathising with the simple villagers and their pastor upon their irreparable loss, and regretting the catastrophe which overthrew the tree and deprived them of its genial shelter? Or who, again, can peruse the almost affecting narrative, by the same author, of the fall of the Raven Oak, and not wish that it had been spared from the axe to this day? " In the centre of Losel's Grove," says White, in his second letter to Pennant, "there stood an oak, which, though shapely and tall on the whole, bulged out into a large excrescence about the middle of the stem. On this a pair of ravens had fixed their residence for such a series of years, that the oak was distinguished by the title of 'the raven tree.' Many were the attempts of the neighbouring youths to get at this eyry; the difficulty whetted their inclinations, and each was ambitious of surmounting the arduous task. But when they arrived at the swelling, it jutted out so in their way, and was so far beyond their grasp, that the most daring lads were awed, and acknowledged the undertaking to be too hazardous. So the ravens built on, nest upon nest, in perfect security, till the fatal day arrived in which the wood was to be levelled: it was in the month of February, when those birds usually sit. The saw was applied to the but, the wedges were inserted

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* "We have the following explanation of the *Plestor* in the *Antiquities of Selborne*," says Sir W. Jardine, in his notes appended to the late pocket edition of White's natural history of that place: — "It appears to have been left as a sort of redeeming offering by Sir Adam Gurdon, in olden times an inhabitant of Selborne, well known in English history during the reign of Henry III., particularly as a leader of the Mountfort faction. Mr. White says: As Sir Adam began to advance in years, he found his mind influenced by the prevailing opinion of the reasonableness and efficacy of prayers for the dead; and therefore, in conjunction with his wife Constantia, in the year 1271, granted to the prior and convent of Selborne all his right and claim to a certain place, *placea*, called *La Pleystow*, in the village aforesaid, 'in *liberam*, *puram*, *et perpetuam elemosinam*.' This *Pleystow*, *locus ludorum*, or play-place, is in a level area near the church, of about 44 yards by 36, and is known now by the name of the *Plestor*. It continues still, as it was in old times, to be the scene of recreation for the youths and children of the neighbourhood; and impresses an idea on the mind that this village, even in Saxon times, could not be the most abject of places, when the inhabitants thought proper to assign so spacious a spot for the sports and amusements of its young people."

into the opening, the woods echoed with the heavy blows of the beetle or mallet, the tree nodded to its fall; but still the dam sat on. At last, when it gave way, the bird was flung from her nest; and, though her parental affection deserved a better fate, was whipped down by the twigs, which brought her dead to the ground."

We have strayed from our subject, and must return to the origin of the term *Gospel Oak.** "The custom," says Mr. Strutt, "of making the boundaries of parishes by the neighbouring inhabitants going round them once a year, and stopping at certain spots to perform different ceremonies, in order that the localities might be impressed on the memories of the young, as they were attested by the recollections of the old, is still common in various parts of the kingdom. The custom itself is of great antiquity, and is supposed by some to have been derived from the feast called Terminalia, which was dedicated to the god Terminus, who was considered as the guardian of fields and landmarks, and the promoter of friendship and peace among men......It was introduced among Christians about the year 800, by the pious Avitus, Bishop of Vienna, in a season of dearth and calamity, and has been continued since his time by the different clergy; the minister of each parish, accompanied by his churchwardens and parishioners, going round the bounds and limits of his parish in Rogation week, or on one of the three days before Holy Thursday (the feast of our Lord's Ascension), and stopping at remarkable spots and trees to recite passages from the Gospels, and implore the blessing of the Almighty on the fruits of the earth, and for the preservation of the rights and properties and it must have been a soothing sight to witness the devotional feelings of the multitude, thus called forth in the simplicity of patriarchal worship in the open air, and surrounded by the works of God."

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* Oaks have sometimes not only been termed "Gospel" trees, but have also been dignified by the title of "Apostles." Thus the fine group, consisting of twelve in number, at Burley in the New Forest (of which a representation is given in the titlepage to Mr. Strutt's volume) is known by the appellation of the "Twelve Apostles." Towards the centre of Coleshill Park, in Warwickshire, there once stood four very aged oaks, forming a square, one occupying each corner, which were familiarly known by the name of the "Four Apostles" (the Four Evangelists, we presume, they ought rather to have been called). Some forty or fifty years ago the steward of the manor fell foul of one of these consecrated trees, and unceremoniously cut it down, for the purpose of repairing the park pales. This sacrilegious act excited the honest indignation of the old park-keeper, near whose residence the trees grew, who, observing that "there always had been four apostles in Coleshill Park ever since he had known the place," swore, with an oath, that if he could have his way "there always should be." Accordingly, he planted another in the room of the displaced apostle. This newly planted tree, on account of its youth, acquired (as might be expected) the name of St. John. We have often seen it in company with its three aged fellows, and believe it is still a vigorous and thriving young tree.

The Gospel oak near Stoneleigh, to which we are now more particularly alluding, "stands," Mr. Strutt informs us, "in a little retired coppice, the solitude of which is equally favourable to thought and to devotion, to the reveries of the philosopher on ages past, and the contemplation of the Christian on the ages to come." We will only add, from our personal knowledge of the spot, that it is much to be regretted that some of the upstart saplings, the impertinent firs and larches of modern growth *, which surround this primitive tree, and interfere sadly with its branches, have not long since been cleared away by the proprietor, in order to give space and a freer circulation of air to the original and rightful occupant of the grove.

Having already quoted so largely from our author's pages, and from others of kindred character, we fear that we have more than exceeded our limits, as well as trespassed on the patience of our readers. We cannot, however, resist the temptation to make one more extract, were it only for the sake of the beautiful and appropriate poetic effusion which it will be the means of introducing to more general notice. Mr. Strutt is speaking of an aged oak in the park at Moccas Court, on the banks of the Wye, in Herefordshire. "The whole estate," he says, "from the very nature of its situation, forming part of the borders between England and Wales, is fraught with historical associations, which extend themselves, with pleasing interest, to this 'ancient monarch of the wood;' among whose boughs the war-cry has often reverberated in former ages, and who has witnessed many a fierce contention under our Henries and our Edwards, hand to hand and foot to foot, for the domains on which he still survives, in venerable though decaying majesty, surrounded by aged denizens of the forest; the oldest of whom, nevertheless, compared with himself, seem but as of yesterday. The stillness of the scene at the present time forms a soothing contrast to the recollections of the turbulent past; and the following lines are so in harmony with the reflections it is calculated to awaken, that it is hoped the transplanting of them from the pages of a brother amateur of

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* These have been very properly omitted in Mr. Strutt's view, as well as in the wood-cut now presented to our readers.

the forests to the page before us will not displease either him or the reader: —

"'Than a tree, a grander child earth bears not.
What are the boasted palaces of man,
Imperial city or triumphal arch,
To forests of immeasurable extent,
Which Time confirms, which centuries waste not?
Oaks gather strength for ages; and when at last
They wane, so beauteous in decrepitude,
So grand in weakness! E'en in their decay
So venerable! 'T were sacrilege t' escape
The consecrating touch of Time. Time watch'd
The blossom on the parent bough; Time saw
The acorn loosen from the spray; Time pass'd
While, springing from its swaddling shell, yon oak,
The cloud-crown'd monarch of our woods, by thorns
Environ'd, 'scaped the raven's bill, the tooth
Of goat and deer, the schoolboy's knife, and sprang
A royal hero from his nurse's arms.
Time gave it seasons, and Time gave it years,
Ages bestow'd, and centuries grudged not;
Time knew the sapling when gay summer's breath
Shook to the roots the infant oak, which after
Tempests moved not. Time hollow'd in its trunk
A tomb for centuries; and buried there
The epochs of the rise and fall of states,
The fading generations of the world,
The memory of man.'"

On a former occasion we expressed our regret that the folio edition of the work before us had not been enlarged, so as to have included portraits of all the more remarkable trees still remaining throughout the country; and we ventured an opinion that Mr. Strutt was restrained from exceeding the original limits of his work by feelings of delicacy towards his subscribers. Our surmises, it seems, were not far from the truth. "The author," we read in the preface to the present edition, "was entreated by several highly esteemed friends to add a supplement to the work, for the purpose of including various specimens of trees which the original limits did not admit of containing. But, however flattering those solicitations might be, his unwillingness to incur the slightest appearance of trespassing on the liberality of his subscribers formed an insuperable bar to his compliance with them." We respect our author's motives, while we lament the loss that we sustain in consequence of them. As the work, however, in this second edition, has now assumed a novel and somewhat altered guise, we do trust that he will so far comply with the wishes of his friends as to add to it another volume. To this plan not the most scrupulous delicacy can frame a reasonable objection. Ere long, therefore, we hope to meet Mr. Strutt again, in company with the ancient denizens of the forest and the grove. In the mean time, we venture strongly to recommend the present volume to the notice of our readers; to such of them, at least, as, with us, admire aged trees and beautiful etchings, of both which it supplies no scanty store. For ourselves we are ready to acknowledge, that we delight in these sylvan haunts and forest glens, where Nature is seen in her wildest, loveliest forms, far more than we do in "the cloud-capp'd towers, the gorgeous palaces," reared by the hand of man.

> ——— "Habitarunt dii quoque sylvas,
> Dardaniusque Paris. Pallas, quas condidit arces,
> Ipsa colat: nobis placeant ante omnia sylvæ."* *Virgil.*

A. R. Y.

Art. II. *Catalogue of Works on Natural History, lately published, with some Notice of those considered the most interesting to British Naturalists.*

Britain.

Murray, J., Esq. F.S.A. L.S. H.S. &c., Author of various Works: A Treatise on Atmospheric Electricity, including Lightning-rods and Paragrêles. Small 8vo. 1830.

This, though a brief, is a very interesting history of electricity. It presents a satisfactory view of its agency in almost all the phenomena of nature; shows how it may be collected, directed, and managed by art; and describes its wonderful powers, and the instruments which have been invented to detect its presence and character.

Electricity is stated to be necessary to animal life, to vegetable developement, and to all atmospheric changes. After describing these its various uses in nature, the author adverts to its concentrated and terrible effects, which sometimes devastate portions of the earth, and which, he imagines, it is in a great measure in the power of man to avert.

To prove and explain this (the main purpose of the volume before us), Mr. Murray brings into view all that is certainly known relative to electricity; interspersed with many curious original observations of his own, illustrative of the effects of this subtle and powerful element. He ascribes to it, as already mentioned, all atmospheric phenomena; all spontaneous motions of physical atoms; the luminous appearances in the air and on earth, viz. Aurora borealis, ignes fatui, shooting stars, St. Elmo's fire, &c. To it, too, he ascribes the formation of aerolites, of which he gives an interesting account; showing in what veneration they were held by the ancient Pagans, who, like the Ephesians mentioned by St. Luke (Acts of the Apostles), worshipped the goddess Diana, *which image fell down from Jupiter*, being no other than an aerolite. Mr. Murray might have added, that they are still idolised by the Mahometans. Burckhardt, in his pilgrimage to Mecca, notices the holy stone, which in remote times was considered sacred by the Egyptians, and is now preserved in the Kaaba of Mecca; which stone, he says, is one of the objects of adoration by the adherents of Ismaelism. It is supposed by Burckhardt to be a piece of basalt, but probably an aerolite. The author also describes what are called *Ceraunium scintre*, or lightning tubes, formed, it is supposed, by the descent of the thunderbolt in the earth vitrifying the sand through which it passes. One is mentioned of the length of nearly thirty feet.

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* ——— "Gods have lived in woods,
And Trojan Paris. In the towers she built
Let Pallas dwell: the woods be our delight."
Trapp's Translation.

Mr. Murray next adverts to the agency of electricity on vegetation. That plants are susceptive of its influence is a reasonable, and a very generally received opinion; but that it effects all that has been attributed to its agency, as causing the direct and retrograde motions of the sap in vegetables, is perhaps still doubtful. Our author adopts M. Dutrochet's theory of the motion of the sap. This is quite natural; as no one but a profound electrician can possibly understand such a theory. Here, it appears, Mr. Murray surrenders his own penetration and judgment entirely. He says, quoting M. Dutrochet, "The roots absorb water, with such soluble matter as may be present: this flows upwards to the leaves, through the lymphatic tubes of Decandolle, and which are found both in the soft and hard wood: this fluid solution, as it ascends, absorbs laterally a portion of the already elaborated and assimilated sap, to form the leaves." What leaves? those already expanded, or such as are reposing in the bosom of the buds? Mr. Murray proceeds; "Being carried up to the leaves in spring, the sap there undergoes a chemical change, by evolving oxygen by day, and carbonic acid gas at night: thus assimilated, it again returns, descending through the bark and soft wood, and giving off laterally in its descent elaborated sap, finally changed into bark and wood." In other words, simple water, impregnated with soluble matters existing in the soil, after being mixed with the essential sap of the tree, is afterwards changed into ligneous fibre! Had M. Dutrochet said that such supplies of watery food assisted to expand the ligneous vessels, and the various parts of the vegetable being, he would have been easily understood; because he, as a chemical and botanical philosopher, as well as the no less enlightened Mr. Murray, should, nay, must, know that all the fibrous structure of a plant is in existence for years previously to the reception of that food which expands them into full developement. The most gigantic oak, and every part of it, was once contained in the narrow bounds of an acorn. Vegetable growth is only the enlargement of preexisting components, urged forward by a combination of heat, light, and moisture, assisted no doubt by the restless currents of electricity. The "organisable properties" of a homogeneous fluid is an imaginary assumption that has too long diverted the students of vegetable physiology from the truth. To a mind unfettered by specious theories, it appears an impossibility that the simple element of water, united with gum, resin, sugar, or any other quality essential to a plant, should ever become changed into the fibrous or woody components of plants. Our author next speaks of, but without describing, "the radiated tracheæ of the wood." That there is a lateral transfusion of both sap and air through the vascular or porous fibrous tissues of both bark and wood, cannot be denied; but if Mr. Murray means that what are called the "medullary rays" in the grain of the wood are tubular tracheæ, it is an oversight; for, in fact, these rays are vertical partitions, of extremely close texture, and are the glossy waves which are exposed by the saw and plane in working panels in joinery. The bladder, fixed to the end of a bleeding vine, swelling till it bursted, appears to be nothing more than its being surcharged by the sap and gaseous air, evolved by the fermentation and expansion of the juice of the tree.

Among other effects attributed to electric action is noticed the very common one of dead disbarked twigs of some kinds of trees bearing a curious fringe of slender icicles in frosty weather. It it always seen in beech woods; and sometimes, though rarely, on the twigs of hornbeam and alder. It is only seen on half-rotten wood, from which the bark has fallen of tenacity, and are more persisting than the hoar frost on other bodies. In position the filaments are divergent like radii from the pith of the twig, and have all the appearance of being produced, as Mr. Murray suspects, as jets from the external orifices of the wood, similar to the columnar masses of icicles which heave up the surface of damp peat-earthy ground in frosty weather. Whether this is an exemplification of the truth of M. Dutrochet's theory, and of the counter currents of the sap in plants, is, however, not very obvious.*

The incident of trees condensing the moisture of the air in foggy weather is noticed. Hence the author infers that thickly wooded countries must necessarily be colder and more humid than naked savannahs. Trees are, therefore, it would seem, ready conductors of aerial electricity; the climate being improved when woods are cleared away, and becoming more moist by planting. Of this circumstance there can be no doubt, as it appears from the histories of both this island and of North America.

He alludes again to the curious phenomenon of certain spiders being endowed with the power of propelling threads, which, being acted on by positive electricity, carries them aloft in the air, even against the direction of the wind. The author does this with a view, it would seem, of replying to Mr. Blackwall, who opposed the doctrine in this Magazine; but, from the many proofs brought forward by Mr. Murray and his friends, there seems to be no longer any doubt of the fact. Mr. Blackwall attributes their ascent to currents of warm air, which are ever rising in a greater or less degree from the earth. That such currents are always in action, notwithstanding Mr. Murray's scepticism, is undoubtedly true; but it is questionable whether they are at all times so powerful as to cause the ascent of any particle of matter, even so light as an aeronautic spider.

The author, in the seventh chapter, proceeds to describe the effects of atmospheric electricity, and the various phenomena of dew, rain, snow, &c. He espouses Dr. Wells's theory of dew; not, it appears, from any experimental proof or convictions of his own, but from pure implicit accordance. That a still atmosphere is necessary to its formation in the open air, is most true, because agitation of the air accelerates evaporation; but that a clear nocturnal sky is also necessary is a mistake. Dew is formed in every degree of temperature under one hundred degrees of Fahrenheit, and certainly is not a precipitation, otherwise it would fall on every body of equal temperature. Dead or sickly plants carry no dew, nor do those on dry places: dew will be copious within a hand-glass, or any other thick covering which obstructs the view of "a clear nocturnal sky" and the agitation of the air, while not a drop is visible without. Healthy plants on every evaporating surface carry dew in calm weather. There also a lower degree of temperature exists; but whether caused by evaporation, or radiation, or whether these terms are used synonymously, our author saith not.

His remarks on meteorology in general bring him to the practical inferences deducible from his preceding observations, viz. that the severity of thunder and hail storms may be moderated by withdrawing a part of the atmospheric electricity by means of well constructed lightning-rods and paragrêles. Aware of the diversity of opinion relative to the effects of these instruments, and incompetent to decide on which side the truth lies, we would only suggest (while we grant the plausibility of Mr. Murray's conclusions), whether if they be so efficient as to divest the storm-cloud of its dangerous effects, they should not only be used as temporary protectors? For, if effective at one time, so will they be at another. The

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* Since the above was written the highly extolled theory of M. Dutrochet has been proved incorrect, and abandoned by himself. (*Foreign Review.*)

Italian peasantry, it has been said, condemned the use of paragrêles and lightning-rods, not because they prevented hail-storms, but because they caused much and frequent unsettled weather.

Whether this was only a foolish prejudice of the peasants, we need not stop to consider; but, as Mr. Murray is an advocate for the use of paragrêles, he must be aware of their effects in fine as well as in foul weather. From all he has brought forward respecting electricity, it is manifest that when it abounds in the atmosphere in its positive character, we have fine weather; and when it changes to a negative state, the reverse. In the first, the air is pure and warm; the aerial spider ascends; plants secrete their juices; dew is copious, &c.: in the second, the atmosphere is turbid, clouds are formed, and rains descend; the flying spider, together with its threads, falls to the earth; plants absorb moisture; and perhaps the tempest rages. From these changes it would appear, that as there are oceans of water and of air, so there is also what may be called an ocean of electricity constantly flowing between the atmosphere and earth, and in quantity alternating from the one to the other. When it abounds in the atmosphere, the aqueous exhalations from the earth are kept in a state of solution. Though not a cloud be visible, the barometer shows that an addition requiring space is raised into the air; and it seems that, when this solutive power is arrested, water and electricity descend again to the earth, and if after a long course of fine weather, often in violent storms of thunder and lightning.

These few concluding observations are deduced from the author's statements; and, though brief, and not perhaps clearly expressed, are submitted to his notice, in order that he may, at some future time, make a more general application of the agency of electricity to define and improve our stock of meteorological knowledge.

Mr. Murray admits that, if the whole country were covered with trees, the climate would become more damp; so, if the country were generally studded with paragrêles, the same effect would follow. The climate of Britain, it is very generally believed, has deteriorated, in being much more changeable than it was sixty years ago. This has been attributed to the extent of planting, to the introduction of green crops, and abolition of fallows in our improved system of agriculture. Some think it is owing to the accumulation of ice at the north pole; and others, taking a wider flight, believe that, as the earth is but a cooled star, it must necessarily decrease in its temperature every year. Be these fancies as they may, there is much room for improvement in meteorological knowledge; and it appears pretty evident that a closer study of atmospheric electricity can alone afford the assistance necessary for such improvement.

Mr. Murray's intimate acquaintance with experimental and natural philosophy renders him particularly fit to prosecute such a study; and, should he have leisure to enter upon it, we are certain he will produce something as worthy of himself as of the science. — *J. M.*

A Descriptive Catalogue of the Contents of the Norfolk and Norwich Museum. Part I. comprising Antiquities, Manuscripts, Printed Books, Drawings, Engravings, Coins, Medals, Seals, and other Works of Art. Norwich. Pamph. small 4to, pp. 46. 1*s.* 6*d.*

This museum has been liberally supported; and it is gratifying to reflect on the pleasure and instruction which local collections of such easy access must afford to the neighbourhood. Every county town ought to have such a museum, and also a botanic garden and a zoological garden; and the time will shortly come when these sources of scientific enjoyment will be as common as town-halls and market-places. This tract was accompanied with some lithographic sketches by our ingenious and skilful correspondent S. Woodward, Esq., author of that useful work *A Synoptical Table of Fossils*, and one of the Committee who have the care of the Institution, and who have ordered the publication of this Catalogue.

An Introductory Address delivered by the Reverend William Turner, at the First Meeting of the Natural History Society of Northumberland, Durham, and Newcastle upon Tyne, held on Tuesday, Sept. 15. 1829: to which are appended the Provisional Laws directed by the Meeting to be prepared by the Committee, and to continue in force until the Anniversary; and a List of the Officers and Members. Newcastle, 1829. Pamph. 8vo.

Report of the Natural History Society of Northumberland, Durham, and Newcastle upon Tyne, for the Year ending August 3. 1830; to which are appended the Laws and a List of the Officers and Members. Newcastle, 1830. Pamph. 8vo.

Transactions of the Natural History Society of Northumberland, Durham, and Newcastle upon Tyne. Vol. I. Part I. Newcastle, 1830. 4to, 11 plates.

Neill, Patrick, Esq., Secretary to the Wernerian Society, to the Caledonian Horticultural Society, &c. &c.: An Address to the Members of the Wernerian Natural History Society. Pamph. 8vo. 1830.

A local controversy between one of the best of men and we do not know very well whom else, of no public interest.

Library of Entertaining Knowledge. Published under the superintendence of the Society for the Diffusion of Useful Knowledge. London. 12mo. 2*s.*

Since we first noticed this work (p. 80.), it has extended as far as the 13th part, forming part i. of vol. vii. Reviews of those parts which treat of insects are in hand by a skilful contributor.

First Report of the Scarborough Philosophical Society, instituted in 1827; and the Museum opened to the Public, Aug. 31. 1829. Scarborough. Pamph. 8vo. 1830.

The title-page exhibits an engraving of the Museum, a most elegant circular building, crowned with a cupola. The Catalogue is already rich in geological specimens; and the Report of the Council gives satisfactory evidence of the prosperity of the institution. From the same Report we learn that "the arrival, in the year 1830, of Mr. W. Smith, justly entitled the *father of English geology,* gave a new feature to the study, and an impulse to the student, which may be considered to have laid the basis of the Scarborough Museum."

Lindley, John, Esq. F.R.S., Professor of Botany in the London University: An Introduction to the Natural System of Botany; or, a Systematic View of the Organisation, Natural Affinities, and Geographical Distribution of the whole Vegetable Kingdom. London, 1830. 8vo, pp. 374. 12*s.*

We have already strongly recommended Mr. Lindley's *Outlines of the First Principles of Botany,* as the best book of the kind in the English language. We are glad to find that Mr. Lindley has just published four copperplates illustrative of it, which may be had by all those who possess the work, on application to Messrs. Longman, through their booksellers. Of the present treatise we may say that it is the best of the kind in any language, and the only complete one in English.

Griffith's Animal Kingdom, from the French of Cuvier, &c. In 8vo Parts.

Since we noticed this work (Vol. II. p. 358.), parts xx. to xxv. have appeared; and though we have not looked into them very minutely, yet we think there is every appearance of improvement. Our reviewer in this department, however, will enter into details.

The Zoological Journal, Nos. XVII. and XVIII., May 1829 to Feb. 1830, and Feb. to June 1830. 8vo. 10*s.*, or, with the plates uncoloured, 7*s.* 6*d.* These numbers will be noticed in our next.

Art. III. *Literary Notices.*

French Works on Entomology. — Sir, Having recently returned from an entomological visit to Paris, I have considered that you may think the following list of works upon insects preparing for or in the course of publication, which have come to my knowledge, worthy of insertion in your Magazine. What a contrast do the zeal and activity for the advancement of science, thus exhibited by our neighbours, afford, when compared with the indifference and lukewarmness of the majority of British entomologists!

Latreille, the prince of entomologists, is occupied upon a *Popular Introduction to Entomology*, to form three thick 8vo volumes, the first of which is now printing. He is preparing a work upon the *Natural Classification of the Weevils* (Curculiónidæ).

De Jean's fifth volume of the *Species général of Coleóptera* is printing, and will be published in about two months: it contains the family Bembidiïdæ, and the supplemental Cicindélidæ and Carábidæ. His *Iconography of the European Coleóptera* is proceeding. His artist was drawing the Nébriæ.

Audouin, one of the most philosophical of modern naturalists, is occupied upon a *General Introduction to the Anatomical, Physiological, &c., Systems of the Linnean Insects*, to form five thick 8vo volumes. He is also engaged upon various interesting memoirs upon the natural history of insects, which will appear in the *Annals of Natural Sciences*, of which he is one of the editors.

Boisduval continues his work upon the North American Lepidóptera, of which objects he has reared at Paris many splendid specimens. He is preparing a *General Species of Lepidóptera*, to be illustrated with figures of the larvæ and details of the genera. The first part, containing the butterflies and hawk-moths, will be immediately published. He is also engaged in describing the insects collected during one of the late national French voyages: some of the plates, in 4to, are already engraved.

Guerin, the first entomological French artist, continues the beautiful iconography of the *Animal Kingdom* of Cuvier. Some of the forthcoming plates, especially that on the lamellicorn beetles, are very interesting, and filled with generic details. He continues his very useful *Magazine of Entomology*, and is also occupied upon the entomological portion of Captain Duperry's national voyage. The plates of this work will be of the highest value to the student, from the immense number of details.

Gory is preparing (in conjunction with Percheron) a monograph upon the Cetoniadæ. All the species and the generic characters are to be figured. The drawings by Guerin, already executed, are very beautiful. To appear in parts.

Percheron is engaged on the preceding work; also on a work upon the Hemíptera, Homóptera, Orthóptera, and Neuróptera. His drawings are very accurate and interesting, since he has been occupied upon the natural history of his objects.

Lefebvre is occupied upon a work on the Cimícidæ, the drawings by Guerin.

Dupont is preparing a work, with figures, upon the new species of beetles contained in his splendid collection.

Saint-Fargeau is writing a general history of the Hymenóptera.

Serville is proceeding with the *Faune Française*.

Robineau des Voidy is contiuuing his work upon the *Múscidæ*.

Duponchel continues his beautiful description of the French moths.

Carcel is at present making a natural history tour through Turkey, Arabia, Egypt, &c. He is preparing a work upon the minute Hymenóptera.

Brebisson is also engaged upon a similar work. — *J. O. Westwood. Chelsea, Sept.* 30. 1830.

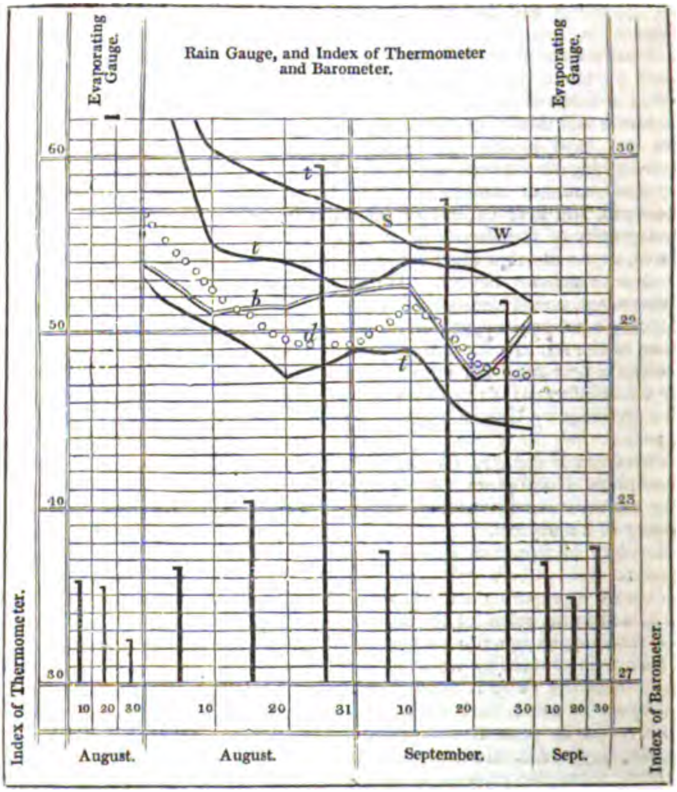
PART III.

MISCELLANEOUS INTELLIGENCE.

Art. I. *Calendar of Nature.*

Scotland.

Diagram, showing the Motion of the Mercury in the Barometer and Thermometer, and the Dew Point, or the Mean of each, for every Ten Days in the Months of August and September; also the Mean of the Minimum Temperature, and of the Mean Temperature within 6 in. of a South Brick Wall, the Thermometer being shaded; the Depth of Rain in the Pluviometer, and the Quantity of Moisture evaporated in the Evaporating Gauge, during the same Period: as extracted from the Register kept at Annat Gardens, Perthshire, N. lat. 56° 23½′; above the Level of the Sea 172 ft., and 15 miles from the Coast; being the Mean of daily Observations at 10 o'Clock Morning and 10 o'Clock Evening.



The double lines, marked *b*, show the motion of the mercury in the barometer; *t s w*, the mean temperature of the air near a south garden-wall; *t*, the mean temperature in the open air and in the shade; *d*, the dew-point; and *min. t*, the minimum temperature in the open air at night.

The coldest day in August was on the 26th: mean temperature of that day 48·5°; extreme cold 39° three feet above the surface, and 31° on the grass; wind westerly. The warmest day in August was on the 4th: mean temperature of that day 60·5°; extreme heat 69°; wind westerly. The mean temperature for the month was 54·4°, nearly 4° below the average temperature for that month for the seven preceding years. There were 6 days of brilliant, and 12 of partial, sunshine; 13 days were cloudy. The wind blew from easterly points on 9 days, and from westerly points on 22 days. There were no remarkably loud winds during the month; but on the 8th, about 5 o'clock in the afternoon, there was a loud and violent thunder-storm, accompanied with hail; and at Errol, in the centre of the Carse of Gowrie, ice fell in large pieces of the size of a cubic inch and upwards, covering an area of about 500 acres, on which the corn crops were completely denuded of the partially filled grain, and the green crops of their foliage. The minimum temperature during the night was 46°, and yet much of the ice lay undissolved in ditches and shady places till near noon the following day: a phenomenon of this nature is seldom observed in Scotland. The coldest day in September was on the 23d: mean temperature of that day 49°; extreme cold 41°; wind variable. The warmest day was on the 27th; mean temperature of that day 58°; extreme heat 60°; wind S.W. There were 8 days of brilliant, and 8 days of partial, sunshine; 14 days were cloudy: the wind blew from easterly points on 5 days, and from westerly points on 25 days. There were loud gales on the 11th, 19th, 20th, 24th, and 25th. The mean temperature for September was 52·9°; the ordinary temperature for that month is 54·7°. The fall of rain during the two past months has been excessive, amounting to 10·39 in.; and from the moist state of the atmosphere, which will be observed by the line representing the dew point being so near the mean temperature, little evaporation could take place: consequently the soil has been all along exceedingly moist. This, accompanied with a temperature under the ordinary mean, has protracted the ripening process to a later period in the season than usual. The general clouded state of the atmosphere, too, has retarded the ripening of wall-fruits; for it is sunshine that communicates that heat to walls by which fruit is ripened in the same space of time with those of the same kind some 6° or 7° farther south in the open air. Too much stress is sometimes laid on walls giving out much caloric throughout the night, by writers on gardening. On a cloudy day, or at midnight, a thermometer, within 6 in. of a south brick wall, will not indicate above a half degree higher than one on a north aspect. During clear sunshine, the difference in favour of the south wall is from 10° to 12°; but they uniformly approximate a short time after sunset: taking, therefore, the mean of the daily extremes of the temperature of a south wall in September, when the atmosphere was for the most part cloudy, it did not exceed the common mean much above 2°. In August, the difference in favour of a south wall is as 4·2°.

In the flower-border, the *Lílium cándidum* opened its elegant flowers on the 1st of August; Timothy grass in fields came in flower on the 2d; the Digitàlis ferrugínea on the 5th, four days later than last year; Coreópsis verticillàta on the 15th, five days later than last season. Peas that came in flower in the field by the 12th of July, were ripe by the 8th of September, a period of 58 days: mean temperature of that period 56·6°; depth of rain 7½ in. The excess of moisture in the air and in the soil prevented the pods from filling, and also retarded the ripening process. Barley that came in the ear on the 16th of July was ripe on the 10th of September, a period of 56 days; mean temperature of that period 56·6°: a curious coincidence of the periods, being exactly the same; last year, too, it should be recollected, the fall of rain in August was excessive. The *Hórdeum nùdum* (Vol. III. p. 442.) ripened simultaneously with English barley in the same field. It should also be remarked, that both earing and ripening were 19 days later this than last year; the seeds were also later in being sown. Wheat that came in the ear on the 30th of June was cut ripe on the 9th of September, a period of 71 days; mean temperature of that period 56·5°. The coincidence between the ripening this and last year (Vol. II. p. 483.), under similar circumstances, would lead to the inference, that, under a temperature of 56·5°, a period of about 70 days is requisite to ripen wheat, from the time the ear appears, with abundance of moisture in the soil. China wheat (Vol. III. p. 442.), which came in the ear on the 12th of July, was cut on the 30th of September, a period of 80 days: mean temperature of that period 55·5°. This beautiful and promising wheat, the seeds of which were kindly distributed by Mr. Loudon, was so severely attacked by yellow gum or rust that the seeds are much shrivelled: this, however, should not prevent another trial. Wheat from England always suffers by rust with us the first year after its introduction, but seldom after. The Boccònia *quercifòlia* was in flower on the 5th of September; white Beurrée pears ripe on the 30th; Elruge nectarines beginning to drop. In the moors, game has been plenty; the partridge seems to suffer by moisture. They are so few and weak, that many sportsmen are determined not to kill any for the season. — *A. G.* *Sept.* 1.

ART. II. *Queries and Answers.*

THE Long-tailed Titmouse. — Some time ago, when my brothers and myself were seekers of birds' nests, we found one of the long-tailed titmouse (Pàrus caudàtus), about two miles from home, containing young ones half-fledged. Being anxious to rear them, we hit upon the plan of catching the old ones, and giving them the trouble instead of ourselves. We accordingly set lime twigs near the nest, and caught six old ones of the seven of which the colony consisted, and brought them away in triumph: but the old ones would not eat in confinement; and all died but one, which we allowed to escape, in the hope that it would come back and feed the young ones. This it did, and, by the most unwearied exertions reared the whole brood, sometimes feeding them ten times a minute. Never having seen this habit stated in any *Ornithology*, I am not aware that it is generally known to naturalists; but it is right to say that I have only found one nest of the species since, and this my avocations would not permit me to examine. I am not aware whether the fact I have stated was an exception to the general habits of this bird, or whether such is invariably the case. Some of your correspondents will, no doubt, be able to give an answer to this. — *T. G. Clithero, April* 17. 1829.

The Wren's Nest. — Mr. Jennings and yourself, in opposition to Montagu, are of opinion (Vol. I. p. 344.) that the wren never lines its nest with feathers; like the knights of the gold and silver shield, both sides are right. It is true, that many wrens' nests may be found which have no feathers, but did you ever find either eggs or young ones in them? As far as my observations go, the fact is, that the nest in which the wren lays its eggs is profusely lined with feathers: but, during the period of incubation, the male, apparently from a desire to be doing something, constructs as many as half a dozen nests in the vicinity of the first, none of which are lined; and, whilst the first nest is so artfully concealed as to be very seldom found, the latter are very frequently seen. The wren does not appear to be very careful in the selection of a site for the *cock nests*, as they are called by the schoolboys in Yorkshire. I have frequently seen them in the twigs of a thick thorn hedge, under banks, in haystacks, in ivy bushes, in old stumps, in the loopholes of buildings, and in one instance in an old bonnet, which was placed among some peas, to frighten away the blackcaps. — *T. G.* *Clithero, April* 17. 1829.

GLOSSARIAL INDEX

TO THE

TECHNICAL TERMS MADE USE OF IN THE DIFFERENT INTRODUCTIONS, AND GENERALLY IN VOLS. I. II. AND III.

Anaca'rdium, heart-shaped, iii. 350.
Abdòmen, the belly, i. 124.
Acanthùrus, from *akantha*, thorn, *oura*, tail, i. 163.
Accìpitres, from *accipiter*, a hawk, i. 121.
Accipitrìna, hawk-like, i. 122.
A'cer, sharp, iii. 140.
Achatinélla, dim. of *achatēs*, an agate, i. 168.
Acùleus, the sting, i. 423.
Acrotársium, front of the foot, i. 277.
Æstivàlis, of the summer, iii. 55.
A'læ, the wings, i. 124.
Alìsma, from *alis*, water (Celt.), iii. 62.
A'lula spùria, bastard wing, i. 123.
Ambulatòrii, walking, i. 124.
Améntum, a bond, iii. 52.
Ampùlla, from *ampulla*, a bottle, i. 28.
Anápheles, from *a*, int., *aphelēs*, slender, i. 54.
Anatífera, from *anas*, a goose, *fero*, to bear, i. 30.
A'nseres, from *anser*, a goose, i. 121.
Anténnæ, horns, i. 423.
Antholỳza, from *anthos*, a flower, *lyssa*, rage, i. 274.
Apetalous, without petals, i. 435.
A'ptera, from *a*, privative, *pteron*, a wing, i. 424.
Aquilìna, eagle-like, i. 122.
A'rbutus, from the Celtic *ar-boise*, austere bush; roughness of the fruit, iii. 350.
Argonaùta, from *argonautēs*, companions of Jason so called, i. 28.
Argùtor, from *argutor*, to make a shrill noise, i. 55.
Armìllæ, bracelets, i. 124.
Arnóldii, from Dr. Arnold, i. 67.
Arúndo, from *aru*, water (Celt.), iii. 59.
A'tropa, from *Atropos*, one of the Fates, i. 435.
Auchènium, below the nape, i. 277.
Aùres, the ears, i. 123.
Axìllæ, axillaries, i. 123.
Bamboo, from *Bambùsa*, iii. 59.
Bánksia, named after Sir Jos. Banks, i. 362.
Bárba, the beard, i. 123.
Béllua, from *bellua*, a great beast, iii. 515.
Biénnis, from *bis*, twice, *annus*, a year, iii. 137.
Bimanes, from *bis*, twice, *manus*, a hand, iii. 513.
Bipinnate, twice-winged, ii. 156.
Bivalve shell, composed of two pieces, iii. 335.
Braird, to shoot above the earth's surface, ii. 480.
Branchiostegous, from *bránchiæ*, gills, *stegē*, a covering, i. 162.
Brùta, from *brutus*, brute, iii. 514.
Buteonìna, buzzard-like, i. 122.
Bùtomus, from *bous*, an ox, *temno*, to cut, i. 161.
Cálamus, from *kalam*, Arab., iii. 59.
Calcària, the spurs, i. 124.
Calochórtus, from *kalos*, handsome, *chortos*, a kind of grass, i. 166.
Calyciflòræ, from *calyx*, and *flos*, a flower, i. 136.
Calýptra, a cover, iii. 52.
Campagnol, from *campana*, a bell, i. 198.
Campéstre, champaign, iii. 140.
Cárdium, from *kardia*, the heart, i. 29.
Carinària, from *carina*, a keel, i. 30.
Carnássiers, from *caro*, flesh, iii. 513.
Carpélla, dim. of *karpos*, a fruit, i. 141.
Carpology, from *karpos*, fruit, and *logos*, a discourse, i. 137.
Cárthamus, from *quortom*, to paint (Arab.), i. 168.
Carúnculæ, wattles, i. 124.
Capistrum, the face, i. 123.
Càput, the head, i. 123.
Catòdon, from *kato*, below, *odous*, a tooth, ii. 197.
Caùda, the tail, i. 123.
Cellulàres, from *cellula*, a little cell, i. 136.
Cephaëlis, from *kephale*, a head, i. 61.
Céra, wax (on the bill), i. 123.
Cérvix, hinder part of the neck, i. 277.
Cetaceous, from *cete*, a whale, iii. 514.
Charàdriæ, sea-larks, i. 122.
Chæ'todon, from *chaitē*, a bristle, *odous*, tooth, i. 163.
Chìone, from *Chione*, the daughter of Dædalion, i. 30.
Chlorophane, from *chlōros*, green, *phainō*, to shine, i. 154.
Clýpeus, shield of the head, i. 423.
Coccinélla, dim. of *kokkos*, a berry, i. 54.
Coleorhìza, from *koleos*, a sheath, *rhiza*, a root, i. 143.
Coleóptera, from *koleos*, a sheath, *pteron*, a wing, i. 424.
Cóllum, the neck, i. 123.
Colymbètes, from *kolymbētēs*, a swimmer, i. 54.
Comátula, from *coma*, a tuft, ii. 115.
Condyle, from *kondylos*, a knuckle, iii. 511.
Coniróstres, conic-beaked, i. 122.
Connate, from *con*, together, *natus*, born, i. 491.
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Corólla, dim. of *corona*, a crown, i. 231.
Corolliflòræ, from *corolla*, and *flos*, a flower, i. 136.
Córpus, the body, i. 124.
Crista, the crest, i. 123.
Crinöídea, lily-like, ii. 115.
Crissum, the vent, i. 123.
Crùra, the legs, i. 123.
Cúlmen, the ridge, i. 277.
Cultch, term defined, iii. 42.
Cummíngia, named after Lady Gordon Cumming, i. 362.
Dentiróstres, tooth-beaked, i. 122.
Dertrum, the hook, i. 277.
Dichlamýdeæ, from *dis*, two, and *chlamys*, a covering, i. 136.
Dicotylédones, from *dis*, two, and *cotyledon*, i. 136.
Didáctyli, two-toed, i. 123.
Digiti, the toes, i. 124.
Diœ'cia, from *dis*, twice, *oikos*, a house, i. 164.
Diplecolòbeæ, from *diplax*, double, *lobos*, a pod, i. 144.
Dipsacus, from *dipsao*, to thirst, i. 431.
Díptera, from *dis*, twice, *pteron*, a wing, i. 424.
Doree, from *dorée*, gilt, i. 89.
Dorsal, from *dorsum*, the back, i. 162.
Dórsum, the back, i. 124.
Dryándra, from Dr. Dryander, i. 360.
Dryandröides, from Dryándra and *eidos*, like, i. 362.
Echìni, sea-urchins, ii. 115.
Edéntes, from *e*, without, and *dens*, a tooth, iii. 513.
E'lytra, the wing covers, i. 423.
Entomology, from *entoma*, insects, *logos*, a discourse, i. 421.
Epidermis of shells, the external membrane, iii. 347.
Epiphyte, from *epi*, upon, *phyton*, a plant, i. 67.
Erica, from *ereikō*, to break, iii. 139.

Falconìna, falcon-like, i. 122.
Fasciolària, from *fasciola*, a winding band, i. 56.
Feldspathic, feldspar-like, iii. 497.
Fémora, the thighs, i. 123.
Fèræ, from *ferus*, a wild beast, iii. 514.
Fissiróstres, cleft-beaked, i. 122.
Flexùra, the bend of the wing, i. 277.
Foliàceæ, from *foliaceus*, leafy, i. 136.
Formòsum, handsome, iii. 139.
Franciscea, from Francis, Emperor of Germany, i. 165.
Fritillària, from *fritillus*, a chess-board, iii. 56.
Frons, the forehead, i. 123.
Gàleæ, shields of the mouth, i. 423.
G*allìnæ*, from *gallus*, a cock, i. 121.
Gallinaceous, from *gallus*, a cock, ii. 442.
Gènæ, the cheeks, i. 123.
Geodesical, relating to the measurement of the earth's surface, iii. 504.
G*lìres*, from *glis*, a dormouse, iii. 515.
Glùma, a husk, iii 52.
Gneiss, a species of rock, iii. 497.
Gonys, inferior point of the mandible, i. 277.
Grállæ, from *grallæ*, stilts, i. 121.
Gressòrii, leaping, i. 124.
Greywacke, a species of rock, iii. 498.
Gùla, the chin, i. 123.
Gymnòtus, from *gymnos*, naked, *nōtos*, back, i. 107.
Gymnospérmia, a naked seed, iii. 353.
Hallux, the great toe, i. 277.
Haltères, the balancers, i. 423.
Hamádryas, from *Hamadrỳades*, nymphs who preside over trees, i. 287.
Hamadrỳades, from *hama*, with, *drys*, the oak, i. 287.
Haustéllum, a peculiar kind of mouth, i. 423.
Hèlix, from *heileō*, to twist round, i. 25.
Hemíptera, from *hēmisu*, half, *pteron*, a wing, i. 424.
Holocéntrus, from *holos*, hall, *kentron*, a spur, i. 163.
Hopeàna, in compliment to Mrs. Thomas Hope, i. 165.
Hùmeri, the shoulders, i. 123.
Hypochóndriæ, hypochondres, i. 123.
Hypoblástus, from *hypo*, under, *blastos*, a bud, i. 142.
Hymenóptera, from *hymēn*, a film, *pteron*, a wing, i. 424.
Inérmis, unarmed, iii. 142.
Inglùvies, the crop, i. 124.
Insect, from *insectus*, cut or notched, i. 424.
Insessòres, perchers, i. 122.
Involùcrum, a wrapper, iii. 52.
Interscápulum, between shoulders, i. 123.
Ipecacuánha, from *ipe*, aboriginal word, in Peru, for root, *cacuan*, aboriginal distinction for that root, i. 61.
Júgulum, the throat, i. 123.
Làbrum, lip or tip, i. 160.
Lagóstomos, from *lagōs*, a hare, *stoma*, a mouth, i. 185.
Lampỳris, from *lampō*, to shine, *pyr*, fire, i. 155.
Lanceolàtus, lance-leaved, i. 167.
Lanceolate, shaped like a lance, i. 235.
Lànius, from *lanius*, a butcher, i. 93.
Lèmur, from *lemures*, ghosts, i. 208.
Lèpas, from *lepas*, a rock, i. 30.
Lepidóptera, from *lepis*, a scale, *pteron*, a wing, i. 424.
Leucòjum, from *leukos*, white, *ion*, violet, iii. 55.
Leucopògon, from *leukos*, white, *pōgōn*, a beard, i. 167.
Lobàtus, lobed feet, i. 124.
L*òris*, from *loeris*, a clown (Dutch), i. 209.
Lòrum, naked line at the base of the upper ridge of the bill, i. 123. 277.
Ligula, a latchet, i. 423.
*Lindlèy*ii, from John Lindley, Esq. F.R.S. i. 165.
Marsùpia, from *marsupium*, a bag or purse, iii. 513.
Marsupites, from *marsupium*, a purse, ii. 115.
Menuon, the chin, i. 277.
Mesorrinium, the upper ridge, i. 277.
Mica slate, a slate abounding with mica, iii. 497.
M*ilvìna*, kite-like, i. 122.
Monochlamýdeæ, from *monos*, one, and *chlamys*, a covering, i. 136.
Monocotylédones, from *monos*, one, and *cotyledon*, i. 136.
Monopetalous, one-petaled, i. 433.
Multivalve shell, composed of many pieces, iii. 335.
M*ùrex*, from *murex*, the point of a rock, i. 56.
N*arcissus*, from *narkē*, stupor, iii. 55.
Nàres, the nostrils, i. 123.
Nàsus, nose, i. 160.
Natatòres, swimmers, i. 122.
Natatòrius, palmated feet, i. 123.
N*aútilus*, from *naus*, a ship, i. 28.
N*epénthes*, from *ne*, negative, *penthos*, grief, i. 80.
N*erìta*, from *neros*, hollow, i. 30.
Neuróptera, from *neuron*, a nerve, *pteron*, a wing, i. 424.
Noctilùca, from *nox*, night, *lucus*, a light, i. 155.
Notorhìzeæ, from *nōtos*, the back, *rhiza*, a root, i. 144.
Nùcha, the nape, i. 123.
O'cciput, the hind-head, i. 123.
Ocellàta, from *ocellus*, a little eye, i. 54.
O'culi, the eyes, i. 123.
O'rbitæ, the orbits, i. 123.
Orthoplòceæ, from *orthos*, upright, *plokē*, a fold, i. 144.
Oryctology, from *oryktos*, fossil, *logos*, a discourse, i. 190.
Os, the mouth, i. 423.
Pachydérmes, from *pachys*, thick, and *derma*, a skin, iii. 514.
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Pálpi, patters, i. 160.
Papilionaceous, butterfly-like, iii. 356.
Pàris, from *par*, equal, iii. 142.
P*ásseres*, from *passer*, a sparrow, i. 121.
Patélla, from *patella*, a little dish, i. 28.
Pécora, from *pecus*, cattle, iii. 515.
Pectoral, from *pectus*, the chest, i. 162.
Péctus, the breast, i. 124.
Peltate, from *pelta*, a target, iii. 141.
Pentacrìnus, from *pentē*, five, *krinon*, lily, ii. 62.
Pentapetalous, five-petaled, i, 435.
Perfoliàta, through the leaf, iii. 138.
Pes, the foot, i. 123.
Petalite, from *petalon*, a thin plate, i. 154.
Phæòpus, from *phaios*, dark, *ōps*, face, i. 297.
Phòlas, from *phōleo*, to seek a hiding place, i. 25.
P*ìcæ*, from *pica*, a magpie, i. 121.
P*ínna*, from *pinna*, a wing or feather, i. 30.
Pinnàtus, pinnated, i. 124.
Plánta, the foot with the toes, i. 277.
Platýderus, from *platys*, broad, *derē*, a neck, i. 55.
Pleurorhìzeæ, from *pleuron*, the side, *rhiza*, a root, i. 144.
Pogònus, from *pogon*, a beard, i. 55.
Polybràchion, many arms, iii. 149.
Polybrachiòne, from *polys*, many, *brachion*, arm, i. 62.
Po*lýgonum*, from *polys*, many, *gonu*, a joint, iii. 142.
Polyómmatus, from *polys*, many, *omma*, eye, i. 56.
Pomadérris, from *poma*, a lid, *derris*, a membrane, i. 61.
Prehénsilis, grasping, i. 124.
Primàriæ, quills, i. 277.
Primàtes, from *primus*, first, iii. 514.
Probóscis, the feeding trunk, i. 423.
Pseùdo-plátanus, false-plane tree, iii. 140.
Quércus, from *quer*, fine, *cuex*, tree, i. 248.
Raptòres, preyers, i. 122.
Rasòres, scratchers, i. 122.
Réctrices, the tail feathers, i. 124.

Rafflèsia, after Sir S. Raffles, i. 67.
Règio ophthálmica, region of the eye, i. 277.
Règio parótica, protuberance over the ear, i. 277.
Rémiges, the oars, i. 277.
Rhèum, from *Rha*, the ancient name of the River Volga, iii. 350.
Rhizamórpha, from *rhiza*, root, and *morphē*, form, i. 155.
Ròbur, applied by the Romans to the hardest kind of oak, i. 248.
Rongeurs, from *ronger*, to gnaw, iii. 513.
Róstrum, the bill, i. 123.
Rubelite, from *rubellus*, reddish, i. 154.
Ruminántes, from *ruminare*, to chew again, iii. 514.
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Sablonous, sandy, iii. 500.
Salep, from the Arabic *sahkleb*, iii. 352.
Salpiglóssis, from *salpigz*, a trumpet, *glossa*, a tongue, i. 362.
Scariósa, scarious, i. 168.
Scapulàres, scapulars, i. 123.
Scansòres, climbers, i. 122.
Scansòrii, climbing, i. 124.
Schists, argillaceous clayey slate, or schistose slate, iii. 499.
Schistose, rocks abounding with schist, iii. 500.
Scorpæ`na, from *skorpios*, a scorpion, i. 162.
Semipalmàtus, semipalmated feet, i. 124.
Sinciput, hinder part of the head, i. 277.
Sòlen, from *sōlēn*, a tube, i. 28.
Soulangiàna, in honour of the Chev. Soulange-Bodin, i. 362.
Spàtha, a slice, iii. 52.
Spéculum, the wing-spot, i. 123.
Sphenótoma, from *sphēno*, to connect together, *toma*, a slice or section, i. 61.
Spirolòbeæ, from *speira*, a spire, *lobos*, a pod, i. 144.
Spóndylus, from *spondylos*, the prickly head of an artichoke, i. 28.
Supercília, the eyebrows, i. 123.
Téctrices caúdæ, the tail-coverts, i. 123.
Téctrices, the wing-coverts, i. 123.
Telàrius, from *tela*, a web, i. 157.
Témpora, the temples, i. 123.
Tenueróstres, slender-beaked, i. 122.
Testaceous, having a shell, iii. 335.
Thalamiflòræ, from *thalamus*, a bed, and *flos*, a flower, i. 136.
Tinctòrius, dyeing, used by dyers, i. 168.
Toise, the French, equal to 1·06575 English fathoms, iii. 499.
Trichodáctylus, from *thrix*, hair, and *daktylos*, a toe, i. 185.
Tridáctyli, three-toed, i. 123.
Tròchus, from *trochus*, a boy's top, i. 29.
Tropæ`olum, dim. of *tropæum*, a trophy, iii. 141.
Trúncus, the trunk, i. 423.
Umbelliferous, umbel-bearing, ii. 156.
U'ngues, the claws, i. 124.
Univalve shell, composed of one piece, iii. 335.
Uropýgium, the rump, i. 123. 227.
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Ventral, from *venter*, the belly, i. 162.
Vértex, the crown, i. 123.
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Vittàtus, from *vitta*, a band, i. 163.
Vólitans, from *volito*, to fly about, i. 162.
Vólva, from *volvere*, to wrap, iii. 52.
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